The Builder.

VOL. XXVII.—No. 1372.

Royal Academy Exhibition.

PAYING another shilling for another look at the pictures, and feeling very gratified at what we have seen of them, as well as grateful for the improved conditions under which we can see all, two thoughts occur in the turning of a turnstile, as some one more than whispered, "Oh, hang the pictures, I've come to see the rooms." Hang the pictures, indeed! Who is to do it to please everybody? We thought, how far the happier of the two must the Royal Academician be who is to be hung, compared with him who is to do the hanging; and what a delightful state of things would be brought about if everybody's individual notion of its necessary reform were some day to be realized in the future existence of an institution so strong in its present growth of a hundred years, as to be very well able to defy some very strong attacks from those who would prune and graft, with little respect for the stem, even, if they could get no new fruit from the old tree. But so long as visitors may come and visitors may go, the Royal Academy will go on for ever,—if another simile may be brooked. We cannot shut our eyes, however, to its shortcomings and mistakes.

Mr. Watts, in his impressive indication of almost entire obliteration and intended universal renovation such as he presents in his imaginative conception of "The Return of the Dove" (45) over the vast plain of subsiding water, to the ark that contains the little remnant of all that moved, breathed, loved or quarrelled; wept or made merry; worked or rested in the once-living world, perhaps, allegorises the only real means of adjusting some difficulties. Mr. Watts is a poet as well as a painter; and though in his other pictures of this year's exhibition, he is not so well represented as on some former occasions, high qualities distinguish his embodiment of chivalry protecting innocence and virtue in "The Red Cross Knight and Una" (125).

Mr. Herbert's most remarkable production is a large desert scene (184), "Gazelle Hunters of North Africa," in unexpected and too-close-to-be-pleasant proximity to a lion and lioness unmistakably intent on making game of them unless they are anticipated and made game of: the bare, sun-burnt waste of rock and sand with no sign of vegetation to deny its barrenness; the wide expanse of sky, with no cloud that would promise moisture—admirably convey the idea of parched desolation and an atmosphere in which a tight cravat would be intolerable. A forcibly executed study of a "Girl of Lower Egypt," descendant of Amron the Victorious, (203), too peculiar personally, figuratively and with regard to costume, to admit of a doubt of her being faithfully portrayed; and "Mary Magdalene" at the tomb of the Saviour on the day of his crucifixion (416), are at once to be identified, by the clear and somewhat hard style of the manipulation, as emanating from one of the very best of British artists.

Besides a grand classic rendering of "Hero lighting the Beacon to guide Leander across the Hellespont" (108), wherein nude nature has been mystified by moonshine and fire-light into decorous dress, though the physical description of the heroine—to say the best and the worst of it—at least equals her poetical development, Mr. Armitage contributes a profile of an Egyptian lady, regarding with mixed concern and curiosity a sick chameleon (272), than whom, if Cleopatra were more beautiful, Antony must have been no weaker than big schoolboys could consider him. His chief work, however, is the smallest; for this is marked by great originality of treatment and of high value by reason of its subject. Mr. Armitage illustrates the Gospel of St. Matthew, iv. 21, "Christ calling the Apostles James and John, the Sons of Zebedee" (365), with a propriety of sentiment and a sufficiently realistic probability of scene and circumstances that conduce very much to gaining consideration and respect for the picture. He also exhibits two clever portraits.

To any one who needs food for reflection,—but who can need it, with their own pocket edition of the world's business troubles and trials for their own special and immediate cogitation?—yet to those so happily exceptional, an exhibition of pictures is a mine of inexhaustible resource; its varied contents offer a vein to the major part of imaginative miners,—gold to all.

Mr. Ward's telling picture of "Grinling Gibbons's first introduction at Court" (144) inculcates a double lesson; one, to those whose common apostrophe is "What odds? It will be all one a hundred years hence!" Another, to the grumblers, who would have least cause to grumble if they had a real one, and gave less time to their pet propensity: there is far less hope for the hopeful, who found their too sanguine belief on a fortuitous show of early good fortune: disappointment in the long run awaits nearly all such, and it is far better to begin with failure than to end with it; and to recollect that platitude is not always "foolish talk." Mr. Ward's picture illustrates a passage in "Evelyn's Diary," describing how Grinling Gibbons, having been introduced to Charles II., who has been astonished by his workmanship in a curious specimen of carving, has been commanded to show it to the Queen, who, from the fact of its being a crucifix, would, in his Majesty's opinion, have been likely to appreciate it as much or more than himself, and have bought it; "but when his Majesty was gone, a French peddling woman, one Madame de Boord, who used to bring petticoats, and fans, and baubles out of France to the ladies, began to find fault with several things in the work, which she understood no more than an ass or a monkey," very much to Evelyn's indignation, who summarily relieves the Queen of the cause of question, by ordering the porter who brought the work of art to take it away. The anecdote is very perspicuously related by the artist, who has found a congenial theme to expatiate on: his aptitude for characterization, knowledge of the costume and customs of the period, and fine taste for colour and effect, have conduced to the production of a thorough realization of the incident. The name of Grinling Gibbons will be associated with perfect skill in wood-carving so long as the art exists; his patient endurance is one example of many to encourage merit that waits for acknowledgment.

It *will* be all one, it may be supposed, with most of us a hundred years hence, so far as mundane relationships are concerned,—unless like the Pole of recent report, whose hair regained colour at eighty or ninety years of age, and who died comparatively youthful at 130;—and all one at last with those who, coming after us, live to take their turn at the wheels that keep Time's clock going for them; for they will share the same senses and the same want of them; the same dispositions and proclivities; the same or similar chances of success or failure; the same fallacies and the same discontent, which is a virtue, for without it there would be no energy, no effort, and no such results as a steady determination not to be satisfied easily frequently obtains:—

> "The time of life is short—
> To spend that shortness basely, were too long,
> If life did ride upon a dial's point,
> Still ending at the arrival of an hour."

So grumble whilst you work, but strictly with and at yourself—not loudly.

Did Luther ever dream of all the influence his dissent from Papal authority would have over the Christian world? Mr. Ward depicts him as the monk who, in his youth and interpretative genius found more than words in the Holy Book so long hidden from custom-bleared eyes. The painter could but show the thoughtful, wasted face and form of the student whose new belief was almost a terror to himself; and this he has done most successfully by means of fit apprehension of character and vigorous imitative painting.

Mrs. Ward has painted the Young Pretender (211) in his happier discontented days, recognising some poor exiled Jacobites, who are glad to kiss his hand extended with kindly grace to raise them as they kneel in homage to the shadow of royalty that has darkened the sunshine of their world's prosperity; but they are loyal gentlemen, and are well repaid as the princely boy expresses his grateful appreciation of their services. "He told them he had often heard of their valour, and that it made him proud, and that he had wept for their misfortunes as much as he had done for those of his own parents; but he hoped a day would come that would convince them that they had not made such great sacrifices for ungrateful princes." Miss Strickland is fortunate in having so powerful and so graceful an illustrator as Mrs. Ward to point the interest of her anecdote: one whose susceptibilities enable her to comprehend the full force of its touching nature, and whose fine taste and great skill give her so much command in securing the sympathy of others. In her many successes, she has never succeeded better in narrating any incident selected for recording than in this, of broken-down but still devoted loyalty; or in depicting the grief-worn ailing exiles in such strong contrast with the bright hopefulness of the boy; their cynosure and the picture's.

Mr. Marcus Stone is the Harrison Ainsworth of the palette and the brush: his dramatic representation of "The Princess Elizabeth obliged to attend Mass by her Sister, Mary" (60), has derived more romantic interest from his method of relating the incident than a less demonstrative and more probable version of it could possibly have given. The bigoted queen sits gloating on the all-sufficiency of ceremony and outward show to bring religious comfort whilst the princess at her side sits in quiet but determined disregard of priests, censing acolytes and of the plotting Spanish and French ambassadors alike, who, in adjoining stalls, are signifying their observation of Elizabeth's behaviour as she trifles with her rings, and looks into vacant space—of which the painter has provided plenty—by stealthily exchanging whispered remarks Mr. Stone paints very boldly and precisely, and shows great discrimination in his choice of costume and accessories; but he shares in a prevailing mistake of giving his actors so much stage room that they lose their proper importance; the carpet is too often now made the first object for consideration in precedence of what may happen to be on it by rights. Mr. Orchardson is less amenable in this respect than usual, though his manner of painting is even more dexterous and fascinating than ever; so much so,

that the admiration it exacts condones the objection, if it exists. "The Duke's Antechamber" (103) is well filled with such an assemblage of applicants for patronage, favour, and assistance, as dependency, toadyism, and exigence, would be likely to bring together at the hour that his Highness might be most approachable. The first to have admission to his presence is the scrivener to provide means for the indulgence of His Greatness in his weakness; for there is show enough to indicate that the fawner and flatterer find a ready ear and an open hand. The poet, with his eulogy; the pharmatist, with his new drug or wash; the musician, with a pretty tune he hopes his ducal lightness will dance to, or mayhap an opera dedicated in consideration of a high note that few besides his mellifluously-voiced grace could reach; the artificer in precious metals, with a design on gold that can never be carried out without his patron's assistance; the jester, the monk, the bully and sneak, and an old retainer, or tenant, or soldier, who, with some real claim to it, is less sure of a welcome than any of them, although he has a pretty daughter. This is a very capital picture, and although it can boast no novelty of design, little invention, the skill that is manifested in its production gives new interest to an old subject, and individualizes it as a remarkable work.

In any desire Mr. Yeames may have had to concentrate attention on his excellent technical performance, "The Fugitive Jacobite" (148), he has absolutely and literally been floored, by himself. Why will so clever, so agreeable an artist make "his room to be preferred to his company?" The interior is a tapestried chamber in an ancestral mansion: the hunted man is about to clamber up the chimney, assisted by the means of a ladder—it must be a short one to have been placed where it is—members of his family anxiously cluster about him; one tall sister keeping watch from the window, whilst a younger one sits in serene unconsciousness of impending danger; for her worldly experiences might be amplified in half a "duodecimo" sheet, at the rate of one page a year; all she knows of territory at present is, that it bears flowers; and the toast, "Over the Water," has with her a mental connexion with butter and milk—never bloodshed—to make it at all comprehensible. May be it is the same little sister who comes pattering down stairs, and whose "Alarming Footsteps" disturb the lovers in a smaller and very pretty picture by Mr. Yeames, with a nice effect, but no cause; for little sister has Utopian views, and thinks it only just and proper, and a very natural state of things, for all to be fond of each other; and if anything like civil or uncivil strife were imminent, her advice would be, that everybody should kiss everybody else, and be friends (432).

Mr. Horsley, too, is fond of disclosing lovers' secrets; he takes a merry, mischievous delight and some pains to show how carefully the pretty damsel of a time gone by guarded from sudden surprises "The Secret Interview" she gave her gallant swain (498), or to what advantage a daring, saucy youth turned the opportunity when the usually wide-awake guardian was "Caught Napping," to kiss the fair hand of her wicked, winsome charge (397). The tender passion again may have influenced "The Gaoler's Daughter," and have given her motive to cull the bunch of sweet blossoms she holds in her hand, as she confronts her father, whose office is less kindly than his cheery face, for he regards her as so much the more typical of bright golden sunshine to lighten his heart and light up his dismal home, from the very dismalness of that home when she is absent and the disagreeableness of his calling (176). These examples of Mr. Horsley's familiar style have the old qualities of luminousness and pleasant colour, and show incontestable evidence of great proficiency in a rather restricted practice of his art.

If Mr. Marks is at once to be identified with his works, it is not from repetition of their subjects, but from the repeated evidence they bring of his originality, and the aptitude he possesses of distinguishing all men he portrays as men of Mark's. His band of musicians conducted by the supercilious "stick-in-waiting" to "The Minstrel's Gallery" (69) are each individualized by some physical peculiarity that is curiously indicative of what manner of men they are, from the pale nervous enthusiast whose soul is in his fiddle, to the drummer who knows he was born to make a noise in the world. Refinement and clever, careful workmanship help very much to give value to this painting.

Refinement degenerates to weakness in Mr. G. Leslie's super-delicate and evanescent young lady in white muslin and "Celia's Arbour" (133). She is a dream of gracefulness—a phantom of prettiness; and her unreality is shared by the fair victim of "Cupid's Curse" (281), who it may be feared will be the greater sufferer of the two, for the deceiver who could have proved himself unfaithful to one so touching, so tender, and so trusting, must be a hardened criminal indeed. May he who has changed old love for new, find that he *has* changed for worse!

Mr. Creswick's landscapes have the same charm as ever: whether in avenues for shade and shelter in "Sunshine and Showers" (70), or in more open space to court fresh, soft breezes, one has but need to follow him in his pathways through homely scenes to feel as national and as convinced of their delightful nature as he himself must be. Whether it be "The Windings of a Rocky Stream" (167), or "An old English Village on the Banks of a River" (305), or such homesteads as "Moorland Cottages" offer to his view, he is equally at home in transferring them to canvas, and asserting that there is little travel wanted to prove the world to be beautiful, and that the humblest, even, may dwell in picturesque wealth, at all events.

ARCHITECTURAL SERIALS IN AMERICA.

WE trust that the increase in America of the number of periodicals devoted to architecture and kindred topics, may be a proof of improved taste on the part of the people. Possibly no other country can show so enormous an amount of buildings of every description, yearly erected; and we can conceive that the inventive genius of a race so peculiarly gifted as the Americans in mechanical contrivances, has found abundant scope in the perfecting of all kinds of ingenious appliances to lessen labour, and add to comfort and convenience; but as yet we see more evidence of the improvement and skill of the builder than of the architect, more credit to be due to the constructor than to the designer. Americans are eminently a practical people; buildings they must and will have, and of the best; qualities of workmanship and contrivances for convenience they can judge of, and they have sense enough to insist upon these; but for artistic finish and for architectural taste they have no means of applying a standard, other than perhaps the last costly structure that has been put up, and so they have to content themselves with what their architect can best give them. What this best may be can be fairly seen in the illustrations of the many journals that are devoted to architectural art, and from the descriptions of unprejudiced visitors, as well as those of their own writers, so that we shall not be thought illnatured in asserting that the general design of American buildings is, at present inferior to their construction. The causes of this are probably the very recent recognition of architecture as a profession, and the scarcity of properly qualified men as professors. Now, however, that there are American Architectural Institutes, and a plentiful supply of serials devoted to architectural literature, there is every hope that a sensible improvement will be seen.

We have at this moment on our table many numbers of publications devoted to the building arts, and may mention the *Manufacturer and Builder, a Practical Journal of Industrial Progress*, published in New York, a large closely filled folio of some thirty pages; the *American Builder and Journal of Art*, published in Chicago, a three-column quarto of twenty pages; and the *Architectural Review and American Builders' Journal*, published in Philadelphia, a large octavo of sixty-two pages. There are others, but these will fairly serve as examples of what our friends on the other side of the Atlantic are doing in the cause of professional progress.

The first on our list, the *Manufacturer and Builder*, is mainly devoted to practical details of constructional industry. Amongst its contents is an instructive article upon brickmaking, by which we should gather that more care is usually taken in the manufacture and selection of ordinary bricks than is attempted here, and that few others but moulded bricks are in general use. Machinery is largely employed, and manual labour as far as possible is dispensed with. A practical hint is elsewhere given which may be of use to our operatives, as to the hardening of cutting tools, which is, that if the point of the tool whilst in use is kept constantly moistened with petroleum, the blunting of the edge will be prevented. "Steel tempered to a light yellow has been turned with the greatest facility by using a mixture of two parts of petroleum and one of oil of turpentine." Some papers upon warming and ventilation appear, and a sensible remark is made as to the absolute necessity of some motive power to give force to the adit of impure air, however heated, showing that holes alone will not always do this, however protected from downward drafts—as some adepts seem to think. The illustrations in this serial, which appears every Saturday, are not numerous, but they are generally unostentatious and to the point, and are well executed. A façade of an iron church in course of erection by the Novelty Iron Works is exhibited, which, for the sake of truth in art, we hope will not be often repeated throughout the country. Iron buildings by the way are numerous in New York, and are often of enormous dimensions. They are generally painted white in imitation of marble, and are usually profusely ornamented. The editor seems very proud to be able to announce to his readers—in large capitals—that "Henry Ward Beecher is positively engaged as a regular contributor," and short articles accordingly appear from that gentleman's pen in the "Home Department." One is on "Too many Irons in the Fire," in which the writer says it is impossible for a workman to have too many, meaning that an artizan cannot make himself master of too many trades. He says,—

> "A working man should be curious to understand every trade that touches his trade. A man with a single trade is like a knife with a single blade. Every blade in addition makes it a better knife, up to the point when it becomes too bulky for convenient use. And this figure very well illustrates the benefit of being able to pursue several different avocations. If the blade of a one-bladed knife breaks, there is an end of it; but if it has two blades, it is serviceable yet."

The architectural designs in this serial are principally of cottages and villas, which seem simple and convenient, and are not noticeable in any special way excepting for the unaccountable omission of all external evidence of chimneys, although fireplaces of usual construction appear in their proper places in the plans (see pp. 56 and 69). From the details of cost we gather that expenses of building have largely increased in the United States, and that they must be in excess of our prices as now ruling here.

The *American Builder and Journal of Art* is somewhat similar in scope to the last mentioned serial. It appears once a month only, and contains a number of short, well-arranged papers of an interesting and useful nature. We find from them that, ingenious as American artisans undoubtedly are, they have not forgotten to apply their cunning to all sorts of tricks in building, and that "scamping" builders and crafty landlords are to be found as plentifully there as here. The editor seems to feel this so strongly that he makes it the theme of his personal chat with his readers. Thus he moralizes:—

> "And we would like to express an opinion here of the character of many men who build houses in Chicago to rent. In our opinion they are not saints. Their bones will not be preserved as miracle working relics. When these men die, and they die slowly, their remains will not be disturbed. But where will their spirits go? Will their spiritual houses be constructed of green lumber, and will the poor souls pay exorbitant rent in a land where cold blasts pouring through chink and cranny will cause their naked souls to shiver? We hope these conscienceless builders will yet reform; we trust they will repent ere a builder's purgatory greets them."

The frequency of fires in America is often alluded to, and if the statements of the Fire Marshall of New York are to be relied on, two-thirds of the fires in that city are traceable to the use of hot-air furnaces.

A short practical paper appears on rat-proof buildings, beseeching the aid of skilled architects to contrive some reliable mode of rat-proof construction, and offering some startling statistics of the ravages in Chicago by these destructive rodents.

The illustrations are of large commercial buildings already existing in Chicago, which, though possessing but slight architectural character, seem commodious and serviceable, and of country residences of moderate size. In these latter, Mansard roofs seem to be the prevailing features, with an odd jumble of details which, we notice here and elsewhere, the designers are careful to claim as "French." In these the decorations are principally wooden embellishments on brick walls. The execution of the illustrations is fairly good, and the buildings represented are undoubtedly useful examples for a practical people, but they are not very instruc-

tive as artistic models. The letterpress is, however, copious, and the articles are written in a pithy style. In fact, on reading the various publications now before us, we are struck with the agreeable absence of what the Americans themselves call "tall" writing, and congratulate the writers on their simplicity of diction as well as on the practical value of their remarks.

The Architectural Review and American Builders' Journal is a magazine of considerable literary pretension. It appears monthly, is printed in large type, and is somewhat widely spread upon the page. The contents show rather more of the process called "padding" than the periodicals before alluded to, and the arrangement of the articles is not nearly so well preserved. The editor apologises for the difficulty in obtaining engravers of architectural subjects, and regrets that "American engravers have not as yet seen fit to pay much attention to the study of architecture, and especially in the minutiæ of details." He, however, seems to overlook the fact that something is required also of the draughtsman, and that the latter must do his part before the engraver can have a fair chance. The illustrations are inferior to some in the other similar publications we have looked over, and as most of them are designs by the editor himself, there seems less reason for their being carelessly or inefficiently produced. A portion of the magazine is devoted to descriptions of European examples, and a series of papers appears on "The Minsters of England," giving short notices of Canterbury and York, pleasantly and instructively written. Landscape gardening receives much attention in America, so accordingly papers are given thereon, which, like many on the same subject, are too theoretic to be of any real use. There are in fact but very few general rules that can be laid down as to the practice of this delightful art, and although no subject is more pleasant to gossip upon, or can be more agreeably and poetically treated by a ready and fanciful pen, it is very difficult to give any really useful directions excepting in the most general and cursory manner.

In an article upon Street Architecture, the editor deprecates the hypercriticism of his English friends, who, he says, ought to be taken to task for at times undeserved severity. He says,—"Even the London *Builder*, usually disposed to be lenient to our errors of judgment, spoke in one of its leaders of the American tricky use of wood as a means of embellishment. Now no people in the world have more to answer for in the 'tricky' sense than the English builders. The most palatial terraces of the fashionable West-end of London are but mockeries, a *sham, a composition of plaster on lath.* And of such are the most of those grand compilations of London street-architecture." The writer forgets that it was not wooden buildings as such that were found fault with, or the wooden ornamentation thereof, but the imitation of stone by paint and sand upon the wood, and the almost constant use of wood for decorated portions of expensive stone buildings, for which there seemed no excuse. The editor's fellow-countrymen have pointed out, how even the Fifth Avenue itself is a sham as to much of its seeming stone work, and that the costly marble Grace Church has a wooden spire crocketted and elaborately decorated, but painted white to look like the rest of the material. But let this pass; we have plenty of our own shortcomings, and have no wish to toss back and forth unkind countercharges.

We are glad instead to be able to congratulate our American friends on a sudden outburst of architectural periodical publications, and to heartily wish them God-speed in the cause of industrial and artistic progress.

MATERIALS FOR A HISTORY OF OIL PAINTING.*

LADY EASTLAKE informs us she has been obliged to make some alteration in the first of the chapters of the second volume of "Materials for a History of Oil-painting," left in a state of preparation by the late president of the Royal Academy. Sir Charles Eastlake had followed Vasari in looking upon the Portinari chapel, in S. Maria Nuova, Florence, as an important centre of the productions of early effort in oil-painting, "or that it had formed a kind of nursery of the art of oil painting in Central Italy." Certain of some inaccuracies in Vasari, and suspicious of more, he does not, however, seem to have discovered any error here. But the researches of Signor Cavalcaselle have shown that the chapel was not the scene of the rivalship of Andrea del Castagno and Domenico Veneziano; for though the records of the hospital attached to S. Maria Nuova prove that both worked there, they also show that an interval of six years occurred between the termination of Domenico's long labours and the commencement of those of Andrea. Moreover, it is ascertained almost beyond doubt, that they did not practise what is called oil-painting. They used oil, as the records also show, but this was in common use in processes of wall-painting, long before the invention of oil-painting. The Portinari family were not the less patrons of art, and, Lady Eastlake considers, as partners of the Medici and agents for them in foreign parts, and in their employment of Memling and Hugo Van der Goes, they occupied a position in Florence, with a corresponding influence on Florentine art that should not be unrepresented. She has, therefore, not plucked them from the page altogether, but simply suppressed such passages as later investigations have proved to be incorrect. Dante's Beatrice, it will be remembered, was the daughter of Folco Portinari, who founded the hospital above mentioned, and employed Cimabue to paint a Madonna for its chapel. With the exception of the omission, then, of the statement of the joint practice of oil-painting by Domenico Veneziano and Andrea del Castagno, in the chapel of this family, no alteration has been made in the materials edited by Lady Eastlake. They are supplemented, however, with a series of professional essays written by Sir Charles for publication, but which have hitherto lain by, notwithstanding some of them were written more than forty years ago.

The productions of the brothers Pollaiuoli are now believed to be the earliest examples of Italian oil painting extant. An account of these artists, with a notice of Antonio da Messina, the Sicilian, who visited Flanders to learn the secret, occupies a large portion of the first chapter. Their works are described, and the dates of them given; and the slow progress the new art made at first indicated. The Florentine artists could admire the drawings and designs of these masters, but their method found no great favour with them. The old preferred the manner with which they were accustomed to the innovation, and even young and rising men, influenced by these, doubtless, hesitated to accept the new practice. Domenico Ghirlandajo may be supposed to have represented the general sentiment when he said that painting consisted of drawing, and that the only method likely to insure durability was mosaic. The experiments by which Hubert Van Eyck arrived at the result that was at first so little appreciated are next given with every technical detail. Resistance to humidity was one of the great points gained by his process; and for a long time this was the only quality the Italians allowed it to possess. They confined the use of it to out-door objects where its imperviousness to damp was a consideration, such as standards carried in processions, canopies, and, Sir Charles adds, caparisons for horses. But at the time that Pollaiuoli was painting his celebrated picture of St. Sebastian for the chapel of St. Sebastiano a' Servi, which was the first example of the application of the new mode to altar-pieces, there were three young men studying with Andrea Verocchino, who eventually embraced the new style with rapture, and created an enthusiasm in its favour. These were Pietro Perugino, Leonardo da Vinci, and Lorenzo di Credi. Their progress with that of the method and modifications they adopted are next minutely described, their movements followed, the society by which they were surrounded indicated, and their works enumerated. Here we have a sight of Leonardo as he went about Milan, quoted from a contemporary writer:

"He was wont to go early in the morning,—I have often seen and watched him,—and ascend the scaffolding (for the picture of the Last Supper is somewhat high from the ground*); he would continue painting there from sunrise to twilight, forgetting his meals, and never laying aside his pencil. Then, perhaps, for two, three, or four days he would not touch the work; yet he sometimes stood for an hour or two in the day merely looking at it, and as if passing judgment on his figures. I have also seen him (as caprice or impulse moved him) set out at noon, under a July sun, from the Corte Vecchia, where he was modelling that stupendous horse in clay, and hasten to the Madonna delle Grazie; there, having ascended the scaffolding, he would take his pencil, and, after giving one or two touches to a figure, he would all at once quit the convent."

The next figure that is made to walk across the canvas is that of Francesco Francia. In the notice of the works of this artist, as of those just mentioned, the most minute technicalities are elaborately dwelt upon. His treatment of the darker colours and deep shadows, the solidity and fusion of his flesh tints and other distinctions are explained with greater fulness than the subjects of his pictures. At every page we are impressed with the fact that this history of painting is the work of a painter, for painters. Sir Charles thus accounts for the fact that such technicalities have been hitherto unnoticed. He says the impressions which great works produce upon the mind are so removed from the consideration of mere art that few feel disposed to inquire into their mechanical parts; but his attention is professedly confined to these material qualities. Hence he has shown us Francia, as indeed Leonardo, Perugino, and the other artists mentioned, not in grand reveries of visions of inexpressible beauty, but as busy with varnishes, distilling oils, grinding colours, determining grounds for shadows, vehicles for lights, hatching, scumbling, and covering too hastily considered work with "pentimenti," or afterthoughts. "There are several pictures under it, some better, some worse," said Sir Joshua Reynolds of his painting of the "Infant Hercules;" and many of the Italian masters might have made the same remark of their chefs-d'œuvre. Raffaelle, Fra Bartolomeo, Mariotto Albertinelli, are next successively examined from this technical point of view. Then are arraigned Ridolfo Ghirlandajo, Granacci, Bugiardini, whose flesh tints are described as less thin than those of their predecessors, and their darks more prominent than lights; and after them Andrea del Sarto, and his friend and fellow-worker, Franciabigio, are examined, and the "transparent system" of the former noted, as expressed in thin flesh, prominent darks, blues, and greens being protected with vehicle, as well as lakes in a less degree; and his ultimate practice of the "semi-solid system" as exemplified in his copy of Raffaelle's "Leo X."

Correggio is treated at greater length than any other painter. First of all, the unpleasant association of his name with poverty is dissevered. "The great painter, though not wealthy," we are told, "was in easy circumstances, and was sufficiently well paid, as appears by existing contracts and receipts, for the works he undertook. The works themselves—among others, the cupolas of two churches—would not have been confided to an indigent professor; and, as Lanzi and others justly remark, the artist himself spared no time, study, or expense in the execution of the important commissions he received, and grudged no outlay on the materials of his pictures. Documents further prove that purchases of land were the result of his increasing fortune, and that his family inherited from him a considerable property." Thus removed from the once current tradition that he was a spectacle Seneca tells us the gods look upon with pleasure, a virtuous man struggling with misfortunes, Correggio still stands before us an unappreciated man. Art-critics are so absorbed with interest in the early Italian and Flemish schools, according to Sir Charles, that they have yet no sympathy for the great painters of Venice and Parma; and a representative of "the new German tendency" even goes so far in the path of depreciation as to date the moral decline of art from "the effeminate Correggio." His occasional trivial treatment of sacred subjects, his unsatisfactory arrangement of drapery, his want of attention to the leading lines of the architecture he was called upon to embellish, his "hot shadows," and other defects, are freely acknowledged; but the effect of these is overpowered in the warmth of the recognition of his fascinating and delicate powers of light and shade, the sweetness, richness, and bountifulness of his "transcendent genius." The foreshortening of the human figure seems to have occupied this painter's attention and care. Some of the figures in his cupolas could not have been drawn except by the aid of clay models, as they are in positions it would be impossible for living models to sustain. Such assistance as he required in this matter was given him, Sir Charles concludes, by Antonio Begarelli, of Modena. A rapid glance at his works in their chronological order, with remarks on his technical methods and materials in each, follows:—

"Every method was familiar to Correggio; the drawings and studies for his frescoes, which are preserved in various collections, are generally executed, or at least completed, in red chalk, and exhibit the most profound knowledge of foreshortening, the most delicate feeling for roundness, and a thoroughly practised hand. His love of gradation

* Materials for a History of Oil Painting. By Sir C. L. Eastlake, P.R.A. Second volume. London: Longmans, Green, & Co., 1869.

* About the height of a man; not more.

and of the imperceptible union of half-tints led him to use the 'stump,' or some similar mechanical means. Among other materials, he appears sometimes to have employed coloured crayons, or, at all events, to have produced drawings similar to crayon drawings."

In a minute manner is Correggio attended throughout all his undertakings, till his death at the age of forty. His beautiful finish and softness are attributed in some degree to the perfection of the under-painting, the nature of which is also elaborately described. He is supposed to have used amber varnish; which supposition has been thought to be recently confirmed by the analysis of a portion of a damaged picture, by the late Professor Moreni, of Parma. But it appears to us there is rather an uncomfortable degree of uncertainty yet attending this inquiry, because, as related by Sir Charles, the particular fragment analysed was a part of the "Procession to Calvary" in the gallery at Parma, which, though attributed by some to Correggio, is by others supposed to be the work of Anselmi. The last chapter relates to Venetian methods, as practised by Giorgione among others; and here, says Lady Eastlake, "the manuscript of the second volume of 'Materials for a History of Oil Painting' stops short." To remedy this incompleteness the selection from the professional essays and memoranda, we have mentioned, was made. The first of these is upon *colour, light, shade, and Correggio*. Here we have the difference in the technicalities of the Venetian and Flemish schools again defined with a precision that must be grateful to students when first brought to a contemplation of their mysteries. This is followed by remarks on the necessity for definitions, on negative lights and shades, natural harmonies, contrasts, finish, space, and effect; some of them being expressed in a few lines. Chiaroscuro preparations are gone into at greater length: indeed, it would be unreasonable to require more exact descriptions of processes than are here given. The painstaking with which the essays on oiling out, on vehicles for shadows, on transparent painting, on warm outlines and shadows, on toning, texture, scumbling and retouching, and glazing, is a remarkable feature. In an essay on "the gem-like quality," in which it is remarked, forcibly, that it is a defect in a picture for anything in it to be capable of being likened to something else, we have an amusing summary of some terms in use in art-criticism:—"A picture, for instance, is said to be golden, to be silvery, to be gem-like, to be mossy, to be woolly, to be wooden, to be tinny, &c.," out of which list the term gem-like is considered most laudatory, because it includes such qualities as nearly sparkling, velvety, glittering, pure, and definite. The mode of attaining this appearance is detailed. That no labour should be apparent is another truth impressed in these essays. "The idea of power is always conveyed when we have an impression that the actor, whatever he may be doing, can or could do more than he actually does, that the strength shown is only a part of the strength that might be shown." In support of this statement we are given Addison's reply to a reproof from a friend for having sent him a long answer to a letter, "I had not time to write a short one." How to compose and paint a single head is the subject of a strictly professional paper. This is followed by one of more general interest on subjects for painting, in which it is laid down that though in descriptions the actors should be "morally interesting," in a picture it was necessary that what is being done, more than who is doing, should be of interest. Michelangelo, in his choice of subjects, disdained to paint cloth, and delighted to depict the human form nude, from a desire to express Nature in its grandest aspects. This feeling, in different degrees of intensity, has actuated, and will continue to actuate thousands. Human beings must ever be the most interesting subjects for paintings; and of these the youthful and beautiful will ever be the more admired. The author says "the exhibition of female beauty will always first attract the eye. But although interest in the object and beauty in colouring may be thus secured, a picture may still need some moral interest—that is, the feelings must be interested; and, lastly, the intellect may be addressed by as much attention to costume or history as can be kept subordinate to more proper claims." The volume concludes with a fragment from a journal book of 1828, on the means and end of art, in which it is shown that the primary appeal made by art to the senses should be connected with another addressed to the feelings, prompting noble and ennobling aspirations and sympathies.

ON TECHNICAL EDUCATION IN FRANCE.

BY A GRADUATE OF THE ÉCOLE CENTRALE.

IN describing the system of technical education as it existed in France in 1853, when I left the "École Centrale," I shall endeavour to show that our neighbours are better supplied than we are with schools or colleges for the study of the applied sciences, a branch of education almost ignored in England, as will be seen hereafter.

Technical education, as recently defined by Mr. Gladstone in a public meeting, includes professional education; in France, the expressions *enseignement technique* and *enseignement professionnel* signify two different things: the former implies just as much as is necessary to acquire proficiency in the useful arts, the latter includes the higher branches of the applied sciences. It must not be supposed, however, that science and art are strictly separate; on the contrary, they are taught together, as one assists the other, and the rudiments of both are considered in France, and I believe justly, to form the basis of a serious education. Literary education is not considered or referred to in any way, for obvious reasons, in this paper.

The *enseignement technique* begins in the "Écoles primaires," or "Schools of Elementary Instruction," which are supported by the "Communes." In these schools young pupils learn reading, writing, grammar, arithmetic, mensuration on the metric principle, and drawing, more or less, usually ornament.

The instruction commenced in the "primary" schools may be completed in one of the four following schools, called "Écoles d'Arts et Métiers," viz.:—Châlons, Angers, Aix, St. Étienne. The three first are considered the best for foremen, and managers of works or manufactures; the last is especially devoted to the training of colliery viewers, or managers of mines. This school is known as the "École des Mineurs" (not "des Mines"), and has acquired no little celebrity from the fact that Boussingault, the eminent agricultural chemist, and Fourneyron, inventor of the turbine, studied there together.

The courses in these four schools include mathematics, drawing, surveying, and the rudiments of chemistry and physics.

The institutions reserved for the *enseignement professionnel* are so numerous that I cannot make an accurate nomenclature of them without refering to official documents, which are out of my reach at present; here is the list to the best of my recollection:—

Mathematics.—Collége Sainte-Barbe, Louis-le-Grand, Collége de France, Collége Chaptal, École Polytechnique (Paris).

Chemistry.—(Natural Sciences) Sorbonne, Jardin des Plantes (Paris).

Fine Arts (drawing, painting, architecture, music).—École des Beaux Arts (Paris).

Medicine, Surgery, Anatomy.—École de Médecine, École Vétérinaire d'Alfort (Paris).

Artillery and Military Engineering.—École d'Application de Metz (Moselle).

Navigation.—École Navale de Brest.

Woods and Forests.—École Forestière de Nancy (this school is only for the civil service).

Civil and Mechanical Engineering.—École Impériale des Ponts et Chaussées, Paris.

Mines and Metallurgy.—École des Mines, Paris.

Practical School (Arts, Manufactures, Civil and Mechanical Engineering).—École Centrale des Arts et Manufactures, Paris.*

Three of the institutions I have just enumerated are what I call special district schools; that is to say, they are placed in the districts best suited for the acquirement of the arts and sciences to which they are devoted. These special district schools are the *Naval* School, in the *military harbour* of Brest; the School of *Forests*, in the *wooded* valley of the Meurthe; and the School of *Mines*, in the *coal-district* of the Haute-Loire (St. Étienne). The School of Metz may also be considered a special district school, being surrounded by hills, affording good practice in military, and especially in "contour" surveying.

The above educational establishments are mostly maintained at the expense of the State; they are all under the control and supervision of Government.

Some of them are the exclusive property of the State, and admit only of in-door pupils, being destined to train students for the public services: École Polytechnique, École Forestière, and École d'Application.

Others are maintained by the State, but are open to all comers—students paying fees for examinations, but not for the lectures: École de Médecine.

Those of Châlons, Aix, Angers, and St. Étienne are supported by the State.

The École Centrale is entirely self-supporting. Most of the institutions enumerated above are of recent foundation, having been established since 1789. The École Polytechnique was instituted by Monge, by order of Napoleon I.

The schools or colleges are liberally supplemented and assisted, first by the numerous libraries and museums, which are maintained at the expense of the State in all the large cities; and, secondly, by several establishments, such as the "Conservatoire des Arts et Métiers," where courses of lectures are open, gratuitously, to all students, for a season of three, four, five, or six months. These courses are very numerous. The *evening* lectures are especially organized for the working-classes, although no distinction is made in admitting students. In Paris the public lectures usually begin in November, ending in April or thereabouts.

But the most wonderful instance of Government liberality is in the chemical laboratories of the École des Mines and of the Jardin des Plantes. In the former, any person bringing a specimen of a mineral will receive an analysis of it, free of expense; in the latter, students of any class or age (provided they have a sufficient knowledge of chemistry) are initiated, gratuitously, in the mysteries of chemical analysis, under the supervision of eminent professors.

There is, probably, no country in the world, not even Germany, offering such facilities for studying the applied sciences as are found in France, and especially in Paris.

The French educational system includes art, pure science, and applied science. The strength of France is undoubtedly in the latter. If we inquire, with the assistance of a good biographical dictionary, which of the civilized nations has contributed the most to the progress of art and science, we shall find that in pure science England stands unrivalled; that our list of inventors is so long as to equal, probably, that of all the inventors of the European continent put together; whereas in the applied sciences we are far behind the French. As to art, we may not be on the top of the list, but we have schools of art, such as South Kensington, which ought to be sufficient to maintain England's reputation in that respect.

Bursaries.—In all the schools or colleges recognized by the State, a certain number of poor students are admitted to follow the courses or classes without paying any fee or subscription. These students (*boursiers*) are elected among the most talented and promising students in the junior classes; for instance, if a pupil has distinguished himself in the "École Primaire," being deserving of assistance in other respects, he will be admitted to any of the upper classes, without payment; on two conditions, however:—1st. He must be recommended by his previous professors; and, 2nd. He must pass a preliminary examination.

Results.—The following are the most palpable results of the French system of technical edu-

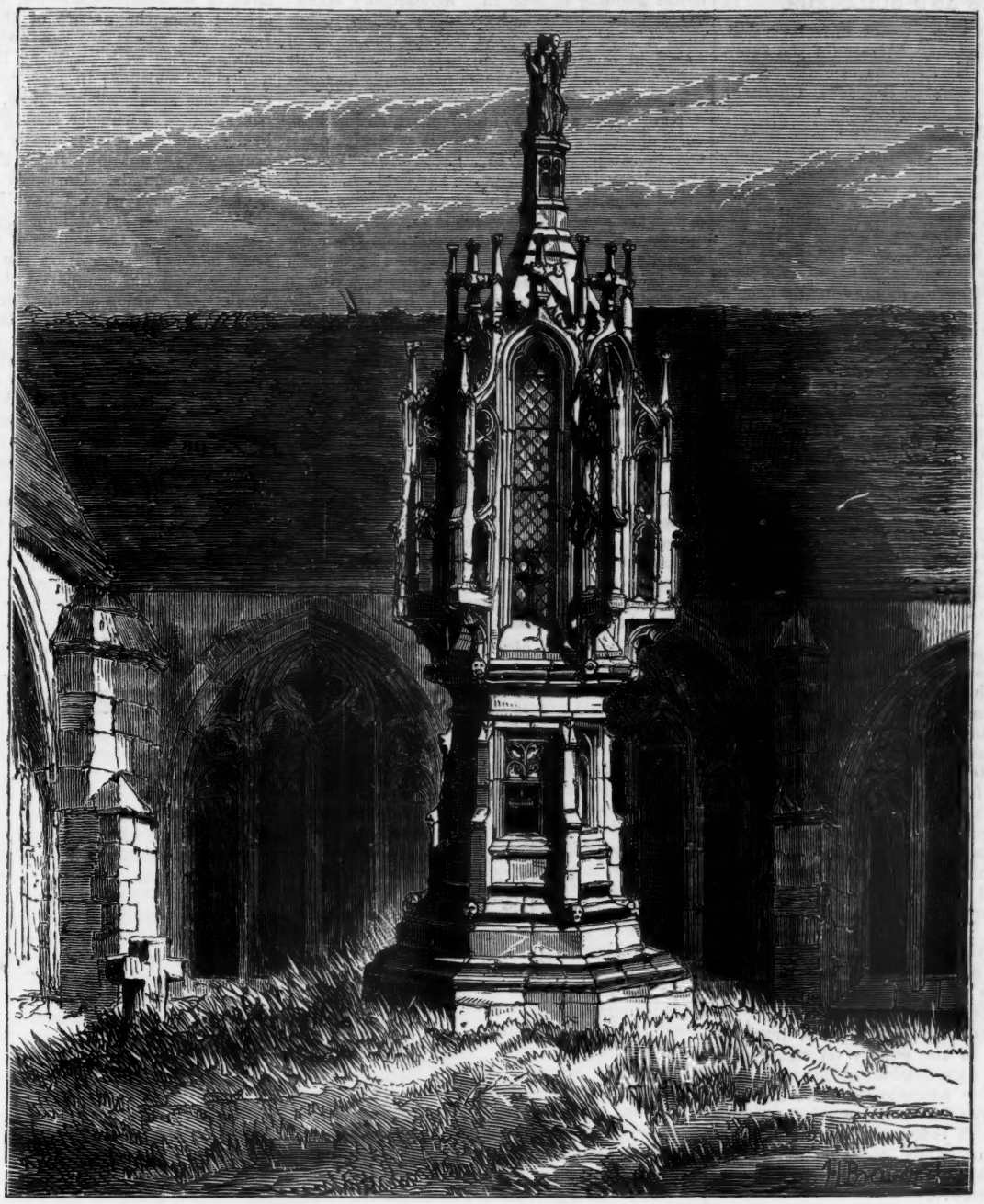
* THE ÉCOLE CENTRALE.—This unique school is due to the initiative of the late M. Auguste Perdonnet, our kind friend and adviser, whom the students were accustomed to call "Father." His life was spent in endeavouring, with variable success, and notwithstanding the most strenuous opposition on the part of the public functionaries, to introduce in France liberal, and especially English institutions. His greatest achievement, probably, was the foundation, with the assistance of the late M. Lavallée and of several eminent professors, of the "École Centrale des Arts et Manufactures," on a plan and principles quite unprecedented in France. This school, which is entirely self-supporting, is at the same time "technique" and "professionnel," being equally efficient for manufacturers and for consulting engineers. The tuition costs about 32*l.* per annum for three years, and for out-door pupils—no boarders being admitted. In my time there were eighteen professors, many of whom were eminent men. The diplomas awarded by the Council of the Ecole Centrale are generally recognised on the Continent as a sufficient guarantee of professional capacity.

The courses are divided into four departments, or *spécialités*:—

1. Builders (*constructeurs*), including railway engineers.
2. Chemists, or manufacturers.
3. Machinists.
4. Metallurgists.

The Ecole Centrale is represented all over the world by engineers, manufacturers, ironmasters, and professors.

A free library for the working-classes has been added to this school within the last few years; and free courses of lectures, similar to those of the "Conservatoire des Arts et Métiers," have been instituted by M. Perdonnet, with the assistance of the professors. There are too many gratuitous lectures in France; the working-men attach little value to them, and frequently go to the lecture-room merely for the sake of warming themselves at the expense of the Government. Very few follow the courses regularly from first to last; and I have seen many bring their own newspapers to the "Amphithéâtre," and read them during the lectures.



ANCIENT CEMETERY LANTERN, MÜNSTER CATHEDRAL, WESTPHALIA, GERMANY.

cation as described above, that is to say, "*enseignement technique et professionnel*":—

1. The poorest and most obscure student may acquire reliable scientific information, and gradually raise himself to the highest positions in the world of arts and sciences.

2. The army and navy are constantly supplied with officers of first-class talent and ability.

3. Managers of manufactories, or of mines, and ironmasters, being accustomed to calculate forces and materials with precision, are able to work economically; that is to say, to obtain the greatest results with the smallest possible expenditure.

4. Graduates of some of the special schools, but especially of the École Centrale, are disseminated all over the civilized world, spreading the arts and sciences, and furthering the progress of engineering, trade, and manufacture.

Conclusion.—The above suffices to show that the applied sciences constitute the strength of France.

We may take a lesson from our neighbours. We have schools of art, and unrivalled engineering works. What we are deplorably deficient in is schools for the applied sciences. There is no institution in England to be compared to the École Centrale. We have few, if any, special district schools, such as that of St. Étienne.

I have no information on technical education in Germany. I expect it will be necessary to copy some of the German, and some of the French, institutions. I do not suppose it will be difficult to obtain information from Austria, Prussia, and Belgium. As to the French, I have lived long enough among them to be assured that they will communicate all requisite particulars, and answer any reasonable request, without jealousy or *arrière pensée* of any kind.

I would suggest, however, not to copy foreign institutions too closely; and I think that the "special district" system I have alluded to could be extended in England with advantage. If my opinion on this subject were of any value, I should advise reserving London for the purely scientific schools, and placing the special establishments in the provinces; for instance:—*Mines* and *Metallurgy* in the Black Country, or in South Wales; *Mechanical Engineering* in Manchester; *Chemistry* in Glasgow; *Hydraulics* in the West of Ireland,—the foundation of a college in the West of Ireland would, perhaps, counterbalance, to a certain extent, the evil results of absenteeism; *Navigation* at Plymouth or Liverpool; and so with all the departments. The special district schools would offer the unquestionable advantage of being accessible to mechanics.

I see no reason why the technical schools of England should not be self-supporting, as the École Centrale, though it might be expedient to apply to Government, in the first instance, to raise the required capital.

W. O'BRIEN, C.E.

Feversham Memorial.—On Monday the foundation-stone of the memorial of the late Earl Feversham, consisting of a market cross, was laid at Helmsley by his son, the present earl.

CEMETERY LANTERNS.

OUR illustration represents a very perfect and beautiful cemetery lantern existing in the court of the cloisters at Münster Cathedral in Westphalia. It will be seen upon referring to our engraving that the glazing and pulley are still perfect, and we know of very few examples where this is the case.

It is highly probable that in the Middle Ages every cemetery possessed one or more of these lanterns, which were lighted upon All Souls' Eve and other anniversaries. Those who have lived in Roman Catholic countries will doubtlessly remember the illumination of the churchyards on All Souls' Eve. We remember seeing the cemetery at Wurzburg, in Bavaria, lighted up by several hundred little glass lamps. In many parts of Germany the graves are supplied with metal and sometimes stone lanterns for this purpose. Ancient stone lanterns of this description attached to graves may be seen in the cloisters of Ratisbon Cathedral.

We are not aware of the existence of either cemetery lanterns or lamps attached to tombs anywhere in England, but some have been of opinion that the Irish round towers were used for this purpose.

Germany is very rich in cemetery lanterns, most of the churches in Bavaria possessing one or more ancient example. The most perfect ones we are acquainted with are to be found at Ochsenfurth, Grünsfeld, Ratisbon, and Saltzfeld. At Hadringsfeld is a cemetery lantern attached to an ancient stone pulpit in the churchyard.

ACOUSTICS AND BUILDINGS.

Two lectures on this subject have been delivered by Mr. W. Fletcher Barrett (of the International College, Springfield) to the Royal Engineers at the Brompton Barracks, Chatham. We print a portion of them:—

The reflection of sound has often been used as a valuable auxiliary in the acoustical arrangement of a building. One of the most remarkable instances of this kind was published in the *Philosophical Magazine* for 1830. A church had been erected in Sheffield in which the preacher was altogether unheard, however great his exertion. Various unsuccessful expedients were tried until the incumbent, happily in this case a scientific man, had a large parabolic reflector of light wood constructed and so suspended that the pulpit was in the focus of the parabola. By such an arrangement the rays of sound issuing from the focus of the mirror would be thrown forward as a parallel beam. The consequence of this was that every word uttered in the pulpit could be distinctly heard throughout the church; indeed, the speaker was more distinctly heard at the far end of the church than at the intermediate portions, because this parallel beam of sound was directly cast upon those in the distant gallery. Unfortunately, however, the reflector acted in both directions. If any one whispered in that distant gallery the sound of the whisper was gathered into the focus of the reflector. The preacher placed in that focus thus heard all the remarks that happened to be made by the people sitting in the gallery, and, as it was anything but pleasant to preach and listen to criticism on the sermon at the same time, the reflector after awhile had to be taken down. The inconvenience of this reverse action might in some measure have been obviated by placing the pulpit not perfectly in the focus of the reflector. In St. Paul's Cathedral a metallic mirror was successfully used to prevent the passage of sound into the roof, and thus removed the unpleasant reverberation which before ensued when the building was used for the evening services. The mirror here employed was of hyperbolic section, placed over the pulpit with the convex side downwards. The sound of the preacher's voice falling upon this convex surface was thus prevented ascending into the dome, and was reflected down upon the people below, who, in consequence, heard with much greater distinctness than those in the gallery on either side. Many other useful applications of the reflection of sound to remedy acoustical defects in buildings might be given, but these will be sufficient to show that, with judgment, you may either properly avoid, or safely seek, its aid in the structures you may be called upon to erect or acoustically to improve.

As already remarked, the reflection of sound explains to us the cause of echo, often so serious a defect in a building. In fact, upon the right use of reflection, or the wrong use of it, depends, to some extent, the right or wrong acoustical construction of a building. Bear in mind, then, that whilst any smooth surface will reflect sound, a broken or rough surface will disperse or absorb sound. Hence, when we wish to get rid of the echo in buildings, if the echo proceed from a distant wall, we may hang curtains or carpets over that wall, and the sound striking the wall will then be absorbed. If the echo come from the roof, hanging a sail-cloth or drapery overhead will cure the defect. Some such simple plan as is here indicated has been generally found to destroy echoes in badly-constructed buildings, and several instances of its success have occurred in my own experience. By breaking up the reflecting surface we accomplish the same end as by placing a curtain. If, therefore, the ceiling be broken up with rafters, or interspersed with hollows, or the end walls have recesses of any kind, we shall have echo, to a certain extent, prevented.

Owing, therefore, to the disturbance arising from reflection you will see why a room of a rectangular form, with a flat ceiling, a flat floor, and flat walls meeting the ceiling and floor at right angles, is a room constructed on bad acoustical principles. Within certain limits the more you depart from this principle the better will your building be for acoustic purposes. Make one of the dimensions of your room longer than the other, and curve the ends of your room and you will improve the acoustic properties of your structure. Make your ceiling not flat, but curved—as the ancients were fond of doing, and as Sir Christopher Wren has done in many of the churches he has built—and you will have a better building to hear in. Acoustically speaking, it is better also to have a low ceiling rather than a high one, because thereby the decay of sound in one direction is lessened, and if your ceiling be very low your room practically becomes a huge speaking-tube.

I must now allude to an effect which has been very obscurely understood until recently, when the investigations of Mr. Scott Russell have thrown considerable light on the subject. It is found that if a speaker be placed very near a wall the sound of his voice is wonderfully lost, whereas if he stand at some distance from the wall he is heard very much better. Frequently I have noticed, when speaking close to a wall in in some regularly-constructed hall, that the sound of my voice has completely traversed along the walls of the building and come back to me again, while I have felt an utter inability to make the audience hear. Now, the chief cause of this may be deduced from Mr. Scott Russell's experiments on waves. That gentleman has established the fact that when a wave of water meets a rigid unbroken obstacle, it is regularly and wholly reflected if the incident angle be greater than 45°. If, however, it make an angle of less than 45°, the wave will be imperfectly reflected; and if the angle of incidence be 30°, or less, the wave is not reflected at all. What then becomes of the wave? It *rolls along* the reflecting surface. If, then, a water wave strike a river-bank at a less angle than 30°—say at a quarter of a right angle,—instead of bounding off on the other side, it will cling to the bank and thenceforward progress as a *roller*. You can often notice this effect when on board a river-steamer; the commotion produced by the paddle-wheels constantly diverges from the source, and when it reaches the banks frequently strikes them at an angle of less than 30°, and a long roller spreading along the shore is the result. Well, the wave of sound is in every way analogous to the wave of water. When that portion of my voice which reaches the wall strikes it at less than 30°, no reflection takes place, but a roller of sound proceeds around the room. Now you will understand why a pulpit placed near a wall is in a bad place; because you have the speaker's voice striking the wall at a very obtuse angle, a large portion at less than 30°, and hence the sound goes rolling round the building, often coming back to the speaker himself, so that he hears a distressing repetition of his own voice. If the acoustic defect of a building be of this kind, it may be obviated by placing the speaker farther from the wall, breaking up into recesses the wall behind, or fixing a suitable curved reflector behind the speaker.

This rolling of sound is undoubtedly the chief cause of the effect noticed in whispering-galleries. For here the voice is purposely directed along the wall, so that almost the whole of the sound strikes the surface at an angle under 30°. But besides this cause, and also the semi-tubular form of whispering-galleries, there is another, arising from the nature of the sound uttered. Loud open words are not propagated through such galleries with anything like the facility of a subdued whisper; in fact, to be heard at all you must speak softly. Now, it is the sibilant character of a whisper that gives it this peculiarity, and there is evidently much of interest and much yet unknown in the singular behaviour of sibilant sounds. Curiously enough, taken in connexion with what I have just been saying, the Astronomer Royal long ago arrived at the conclusion that the sounds of *s* or *z* resemble in their mode of propagation the rush of a *bore* on a river, and has compared them to a broken-headed sea, which meeting an embankment is not regularly reflected as the larger waves would be, but runs along the bank as a roller. The same authority also states that sibilants are not capable of being returned by reflection like an ordinary echo; and I may add a further peculiarity, viz., that it is this class of sounds which have the most profound effect on those recently-discovered and wonderful phonoscopes, sensitive flames.

I wish now to direct your attention to a further illustration of the value of a curved over a flat surface for the reflection of sound. You will remember what I said in the last lecture regarding the loss of sound by rolling round the walls of a building, a phenomenon which occurs when the sound-waves meet the wall at a very oblique angle. Now, let S, fig. 1, be a speaker standing

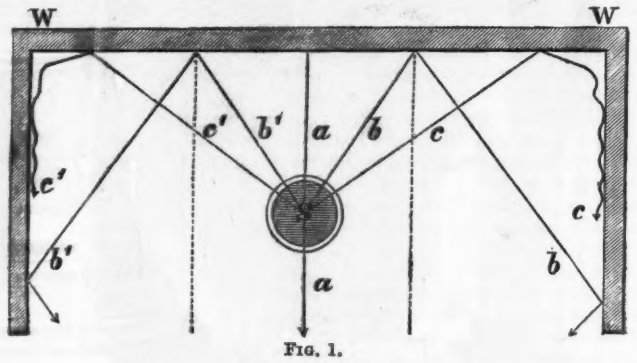


FIG. 1.

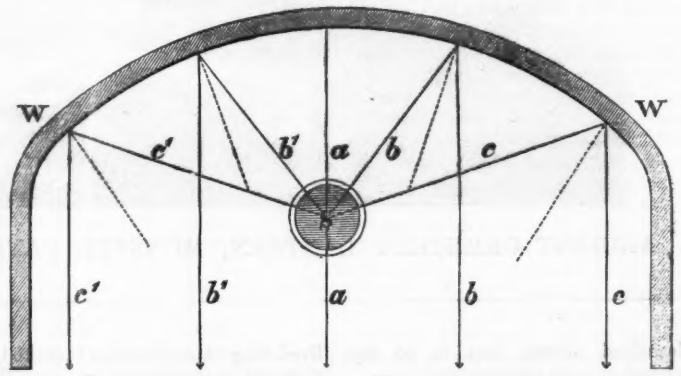


FIG. 2.

near to a flat wall, W W. The sound diverging in all directions from S, will strike the wall at every angle. Let us consider the three rays of sound *a*, *b*, *c*; the first will reach the wall W W perpendicular to its surface, and will be reflected straight back in the direction of the arrow; *b* will strike the wall at an angle, but still, nevertheless, will be reflected; *c* reaches the wall at an angle approaching 30°,* and consequently is not regularly reflected, but henceforth propagated in part as a roller round the room. This of course occurs with all the rays falling on the two extreme ends of W W; and you will further notice that the nearer S is to W W, the greater the obliquity of the incident rays, and the larger will be the number of rays then abstracted from the total volume of sound.

But imagine the more distant portions of W W to be bent forward, the incident rays remaining the same, they will now meet the wall at a less oblique angle, and this is the point to be gained. Hence, as will be seen from fig. 2, those rays which before were not reflected are now sent forward with the others. Still more perfectly would this be the case if the wall had a parabolic curve, and the speaker were placed in what would be the principal focus of that curve.

* That is, 30° from the reflecting surface. I have put it thus for the sake of simplicity, but usually the angle is measured from the *normal* to the reflecting surface.

There is such a thing as a complete sound shadow, and there is a partial sound shadow, corresponding to, though not produced in the same way, as what in optics we should call an *umbra* and a *penumbra*. Hence, just as we require a clear line of sight to see a speaker well, so we require a clear line of sound to hear a speaker well. Architects have sought to obtain this by a proper arrangement of the seats in a building. Perhaps one of the most successful forms which has yet been adopted is that by which the seats in a building are not arranged in a perfectly straight line gradually rising upwards, but in a curved line. In this way the sound of the speaker's voice, unobstructed in any way, can reach the persons on these seats. Such a curved arrangement has been termed an "isacoustic curve," and I believe has proved successful in those buildings where it has been tried.

We must now turn our attention to another and most important point in the acoustics of buildings; viz.:—The *reinforcement of sound*. Every one knows that in some buildings it is extremely difficult to make an ordinary voice heard beyond the vicinity of the speaker. The speaker labours and exerts himself to the utmost, but fails to make himself heard. A gentleman once said to me, after he had been speaking in the Rotunda at Dublin, "It appears as if some one were in front soaking up my words with a sponge as soon as the syllables had left my mouth." All the efforts of the speaker are thus exerted in sustaining his voice; his attention is diverted from what he is saying, and a miserable failure is often the result. On the other hand, we all know that in some places large audiences can be addressed with perfect ease, the reaction of the attentive listeners upon the speaker giving increased strength and stimulus to his utterance. Now, can we discover the cause of this difference? The loss of sound by improper reflection does not account for it by any means, for we may find buildings on precisely the same model, and yet with very different acoustic properties. What, then, is the cause? You will notice that if there be two buildings of equal size and similar shape, and one building be better for hearing in than the other, that building will in all probability have more wood lining its interior than the other. I could not adduce a better example of this than is to be found in the theatre of the Royal Institution of Great Britain. The shape of this theatre is semicircular, with the seats sloping upwards; but the great point is that this theatre is entirely lined with wood. Imitations in the shape of this theatre have, I understand, been made in England and on the Continent, and have in some cases failed, simply from the omission of this most important item of exposed wood. Again, the recently-destroyed Opera-house in the Haymarket was noticeable for its excellent acoustic properties, its structure interiorly was chiefly of wood; and so with many other buildings, both ancient and modern. The theatres of the Romans, for instance, were notable for their good acoustic effects; and these theatres were almost uniformly constructed of wood in the interior.

What, now, is the action of the wood? *It is to reinforce by its own vibrations the sound of the speaker's voice.* When the string of a musical instrument is caused to vibrate, by its own motion it can stir but a very small portion of air; but when this string is associated with a surface of wood, it throws that wood into vibration, and thus creates a vibratory area of much larger surface, which produces a correspondingly greater disturbance of the air. In a piano, or harp, or violin, we do not hear the sound of the strings of any of these instruments, but we hear the sound of the wood to which those strings are attached. I can illustrate this very convincingly, I think, by means of two wires which have been differently strung on to the bracket above. One is merely depending from a cord which is tied to the iron bracket. Thus arranged, this wire cannot throw any wood into vibration, for the cord completely cuts off the wooden floor of this room; the other exactly similar wire is first connected with this wooden tray, which is also suspended by a cord from the bracket. A weight of 28 lb. strains each of these wires. I now pluck the first wire; you hear no sound, for the wire by itself is incompetent to disturb the air around to any great extent. I turn to the other wire and pull it aside: immediately you notice a marvellous difference; the sound is loud and full. This increased loudness is simply produced by the wood overhead, which plays the part of an ordinary sound-board. Here, then, as in all cases of stringed instruments, it is the vibration of the board that you hear, not that of the wire, although the latter is the exciting cause of the former.

I now wish to direct your attention to the fact that these inaudible sonorous vibrations can be propagated through a considerable length of matter, and be made to give rise to audible vibrations at the distant extremity. Here, for instance, is a wire firmly attached to that wooden screen. The wire, as we know, is a conductor of sound. If now I excite some slight vibration in the near end of the wire, by filing it, for example, the crepitation travels up the wire with the velocity of sound, reaches the screen, and there for the first time becomes audible; simply because it has thrown the wood of which that screen is composed into vibration. Now, just as that wire conveyed sonorous vibrations throughout its length, and just as that surface of wood made those vibrations audible, so the air can transmit the sound of my voice,—in one direction transmits it to this same wooden screen;—and can there now be a doubt in your mind as to the action of the wood when these aërial vibrations reach its surface? Not only are you aware of the fact that a sound-board behind a speaker will increase the distinctness of his voice, but you can visualize the manner by which this augmentation is produced.

Let us now inquire into the value of different materials as regards this reinforcement of sound. This important point we can at once experimentally determine by means of the apparatus before me. Here are a set of boxes, each provided with a little door at its side, which, together with the whole interior of the box, is thickly padded, for the purpose of rendering them "sound-tight." I now start this little musical-box, and, opening the doors, place it within the innermost chamber, shutting all the padded doors after it. The music of the instrument now ceases to be heard, for it has been utterly quenched by the absorbing surfaces through which it struggles in vain to pass. A small aperture, protected by little valves of felt, runs through all the boxes. Through this aperture I now thrust a light wooden rod; the wood is a conductor of sound, and as its extremity strikes the musical-box within, you hear a feeble sound of the music, apparently emanating from the free end of the rod. On the top of the rod I lay a disc of wood, and now you hear the music as plainly as if the origin of it were outside. The wooden disc reinforces the sound conducted up the rod, by exposing a large surface, which can easily be thrown into vibration. Instead of the wood I now substitute this piece of slate, placing it on the top of the rod: now you perceive but little reinforcement of the sound. I take a tile, and you hear a feeble augmentation. I take a cake of plaster broken from a wall, and there is now, practically, no reinforcement of the sound. I take one of these tuning-fork boxes, made of very light wood, and containing an open mass of air in the interior, and placing it on the top of the rod, you observe this powerful reinforcement.

The extreme importance of this experiment in its practical application to buildings will at once be seen. Imagine the interior of a building lined with plaster, with wood, or with stone, and instead of this musical-box as the source of sound, substitute the voice of a speaker; further, let the conducting-rod of wood be replaced by the air between the speaker and the walls around him. The walls of such a building, if covered with plaster, slate, or stone, would be almost or altogether unable thus to strengthen the sound of a speaker's voice; whereas if covered with wood the voice would be strongly reinforced. This, then, is the explanation why, in buildings lined with wood, speaking is so very much easier than in corresponding structures the interior of which is plaster or stone. Curiously enough, there is in the very room in which I am speaking an illustration of this fact. For this lecture-room was, I understand, most imperfect for auditory purposes, and most painful to speak in. An alteration was therefore made, and these side pieces formed of wood, were erected behind the speaker. Moreover, within these side pieces are air-chambers which, as we shall explain directly, further strengthen this reinforcement. Speaking within this room is now perfectly easy, simply from the fact that everything I say is taken up and reinforced by the vibration of the wooden screens behind me. Before quitting this subject, I would just allude to a fact which has often been noticed by architects; and that is, that in buildings which are newly plastered there is more difficulty found in speaking, than in old buildings. It is noticed that as the plaster becomes dry, the acoustic properties of the building improve. The reason of this is probably to be found in the fact that the drying of the plaster makes that material more homogeneous, and thus increases the elasticity of its structure. When dry the plaster is therefore, to a certain extent, able to accept and give out these vibrations, which in its moist, unelastic state, it would have been altogether unable to do.

We are now in a position to advance a step further, and can investigate the reinforcement of the voice of the speaker, derived from quite another cause. If I speak in front of this membrane which is stretched over a frame, you will hear certain of my words reinforced, but you will not hear *all* of those words reinforced. When our musical-box was placed upon the table you heard *every note* reinforced. Here on the contrary when I speak, you hear this loud deep tone occasionally coming out. What is the cause of this strange effect? In the membrane we have a *sympathetic* vibration, which was not the case in the reinforcement by the wood previously. The apparent sympathy between the membrane and certain tones I will try to make evident. To the centre of this membrane I have attached a light concave mirror about the size of a sixpenny-piece. From this mirror I can reflect a strong beam of light on to the screen. You will find that every time the membrane reinforces the sound of my voice, that patch of light thrown by the mirror upon the screen will begin to quiver. This quivering is derived from the shaking of the membrane; thus showing you there exists a sympathy between the tension of the membrane and certain of the notes in my voice.

Important as are these considerations, some, however, may be inclined to say, "Of what use to us are they?" Gentlemen, the truest use of knowledge, its application to the benefit of mankind, is never seen at once; and a proper insight of the true value of scientific inquiry lies far below mere surface observation. Acquaint yourselves well with the principles of your study, and you will be at no loss to use them, for practical applications will constantly unfold themselves to the properly cultured mind. For example, from the facts already placed before you, it is easy to see how valuable an aid the resonance of the column of air contained in a building would be to a speaker's voice, if that air could be properly sub-divided and attuned. The ancient Greeks, whose theatres were built chiefly of stone or marble, sought to make up the lacking reinforcement, owing to the want of elastic materials in these structures, by employing the aid of resonance. A series of hollow brazen or earthenware vessels, of carefully graduated sizes, were placed beneath the seats of their theatres. These vessels, termed "echeia," were found greatly to strengthen the speaker's voice, more particularly when the speaking was intoned. For each echeion selected from the speaker's voice a note which was in unison with itself, and by its resonance reinforced that note. Likewise there can be no doubt that the cavities which exist in the construction of buildings act in a similar manner. The air enclosed within hollow spaces below the floor, or above the ceiling, more or less, accommodates itself to the vibration occasioned by the speaker's voice. Hence, where there are these cavities, the resonance is powerful, and often very useful. Thus, in the theatre of the Royal Institution, to which I referred just now, there are open spaces beneath the seats, below the floor, and behind the wooden walls, all of which add greatly to the resonance and good acoustic properties of that building. In the opera-houses of Italy it is, I believe, the custom to have below the orchestra hollow spaces, and the orchestra itself is constructed of thin wood. The acoustic success which must attend an orchestra thus constructed will, however, largely depend upon the fact that by placing the floor over a hollow space we give increased elasticity to that surface, and therefore bring the vibration of the wood more powerfully into play.

Now this strengthening of the voice by resonance differs from the prevention of its decay by proper reflection and condensation, inasmuch as whilst the two latter give increased loudness without increased smoothness, resonance, on the other hand, gives a musical character or richness to the voice of the speaker. This property indeed, in some cases, as in the vaulted roof of cathedrals, may often be so great as to be a disadvantage unless the speaker intones his voice

so as to keep time to the musical resonance of the building. And here we have probably the philosophy of the origin and practice of intoning services in cathedrals.

The reason why resonance imparts a musical character to the voice I will endeavour to explain. Here is a narrow slit through which I blow, and you hear, as the result, an unpleasant rustling sound, nothing more. Over this slit I place this wooden tube: blowing once more you now hear a rich musical note. In fact, I have constructed an organ pipe, the philosophy of which you doubtless already perceive. The column of air within the tube placed over the slit, selects from the rustling sound a note to which it can respond. Entering into vibration the air reacts upon the confused rustle at the slit, and thereat urges greater unison with its own period of motion, and thus augments the volume of the sound. The music of an organ is therefore solely due to the resonance of its pipes. Pipes of varying length will respond to various notes, though placed over the self-same slit; because, as I have already said, the buzzing noise at the slit contains a mixed multitude of notes, from which the pipe selects and responds to the note proper to itself. Just as here, when I hold a number of tuning-forks of different pitch over one of our resonant jars you hear a loud resonance, but if I take away one, two, three, of these forks, you still hear the resonance equally loud. If, however, I restore the others and remove this one, the resonance is gone. Amongst the several notes sounding in its neighbourhood, the column of air can reinforce only that note whose rate of vibration is coincident with its own.

The effect of resonance in raising sounds to the dignity of music cannot perhaps be better shown than in the following experiment. I have here a tiny gas flame, which, whilst burning, originates a feeble vibration, chiefly from the inaudible explosions which occur during the combustion of the gas. If I enclose the flame within a tube, the draught thus created will render these explosions more pronounced, and at the same time the resonance of the column of air within the tube will impart to those explosions a musical character. Here, too, the vibrations of the flame, which apparently consist in its rapid extinction and re-ignition, are now forced into a rate which synchronizes with the rate of vibration of the resonant air within the tube. A longer tube placed over this flame gives, as you hear, a lower note; this tin tube, 14 ft. long, and nearly 4 in. wide, placed over a larger flame, gives this loud low organ note, forcible enough to shake the very floor of this room.

We must now inquire how the large volume of air in a building can reinforce the comparatively rapid vibrations of a speaker's voice. At first sight it would seem unlikely that this could be the case, the length of a building being so vast in comparison with the length necessary to resound to the sound of the voice. This difficulty, however, in a measure is removed by the fact that the general mass of air in a building can subdivide itself, can split up spontaneously into aliquot portions, and thus vibrating give rise to a resonance which would otherwise be impossible. The air inside this organ-pipe, for example, when I blow gently, divides itself into two vibrating parts: when I blow more strongly the air has divided itself into three vibrating parts with surfaces of comparative rest between. It would take me too far astray, and would besides be impossible in this limited time if I were to explain why this is. That such a division and subdivision do take place can be shown experimentally by lowering this little membrane into the pipe, when you hear it alternately silent, and sounding as I raise and lower it.

And there can, I think, be little doubt that the air within a building behaves very much like the air in the interior of a gigantic organ-pipe. The entire mass of air in a large room, if it could be thrown into vibration as a whole, would yield a note of a pitch so low as to be quite inaudible. By subdivision, its parts can, however, vibrate more rapidly, and give rise to that resonance which is often called the *note* of a room. This note you may observe by making a noise in a room: a sharp ear can then often detect a faint musical sound lingering after the noise. So in speaking it is desirable to find the note of the room, and endeavour to pitch the voice to suit that note.

This brings us to the question, what determines these subdivisions?—for as they determine to some extent the acoustic properties of a room, whatever influences them must be important. An altogether satisfactory answer I cannot give. Two points, however, seem worthy of consideration—namely, the dimensions of a room, and the presence of rows of pillars in a regular series, recesses, &c., all of which, more or less, favour subdivision. In a flute, for example, the note can be raised by uncovering the holes, these holes determining the nodes of the vibrating column of air within the tube. Probably an action somewhat analogous may occur in a building. The *dimensions*, however, are also important. It appears that for good acoustic properties a building should be so constructed that its different dimensions shall be in some simple relationship to each other. An analogous effect is well known in music, for if two notes have the simplest possible relationship to each other's rate of vibration, as 1 to 2, or an octave, the combination of those two notes is more harmonious than any other combination. Next to this would be the rate of 2 to 3, or the fifth, and next the ratio of 3 to 4, or the interval of a fourth; the harmony decreasing with the simplicity of the combination. Further, in the case of three numbers a musical or harmonic proportion exists when the first is to the third as the difference of the first and second is to the difference of the second and third: thus, 2, 3, 6 are in harmonic proportions because 2 : 6 :: 1 : 3. And that an approach to an harmonic proportion between the three dimensions of a building is better than an unsymmetrical arrangement gains some support by citing the following proportions of buildings famous for their good acoustic properties.

FREE TRADE HALL, MANCHESTER.

Height, 52 ft., or as 2; unit, 26 ft.
Width, 78 ft., „ 3.
Length, 130 ft., „ 5.

ROYAL INSTITUTION THEATRE.

Height, 30 ft., or as 2; unit, 15 ft.
Length, 45 ft., „ 3.
Width, 60 ft., „ 4.

WESTMINSTER CHAPEL.

Height, 50 ft., or as 2; unit, 24 ft.
Width, 67 ft., „ 3.
Length, 120 ft., „ 5.

In all you will perceive a very simple ratio of their proportions. The last quoted is a building recently erected, and has proved a great acoustic success. Besides its excellent proportions, this building has in its interior a smooth apse behind the speaker, which may assist by reflecting the voice, and certainly with the curved ceiling prevents the waste of sound arising from oblique incidence. Then the extensive wooden ceiling and other wood surfaces, greatly aid by their reinforcement; and finally the large hollow spaces above the roof and below the building afford cavities where resonance can take place. I am inclined to attribute to this form of ceiling great value in the acoustic construction of large buildings.

Such, then, is a rapid and confessedly imperfect outline of some of the more important points connected with the acoustics of buildings. Summing up what should be avoided, and what it is desirable to secure in the construction of buildings as regards speaking, what we have learnt can be comprised under three heads.

I.—*We have to avoid the waste of voice:* (*a*) by the production of rollers of sound from oblique incidence; (*b*) by echo and reverberation from improper reflection.

II.—*We have to secure the prevention of the decay of voice:* (*a*) by condensation of the sound; (*b*) by proper reflection; and (*c*) by a proper arrangement of the seats.

III.—*We have to secure a reinforcement of the voice:* (*a*) by lining the interior of a building with elastic materials, such as wood, and, where possible, having the ceiling of the same; (*b*) by employing the resonance of cavities within a building, having spaces above its ceiling and below its floors; (*c*) by endeavouring to obtain some simple ratio between the various dimensions of the room.

New Town Hall for Leicester.—At a special meeting of the Leicester Town Council held on Tuesday, it was decided by a majority of 3 (27 votes against 24), to devote 3,000 square yards of land, originally purchased at 30s. a yard, to the erection of a new Town Hall (about 2,000 yards to be appropriated to municipal buildings, and the remainder to a large hall to be built at a future time), the present Guildhall, which has been used for about 370 years, being inadequate for the requirements of the borough.

REPORT ON ARCHITECTURAL EDUCATION.

A COMMITTEE of members of the Royal Institute of British Architects, and delegates from various cognate societies have been considering for a long time past—first, the expediency of establishing a "School of Art accessorial to Architecture;" and secondly, the question of Architectural Education generally.* After many meetings, the following Report has been agreed on, and has been sent to us for publication:—

The committee appointed by you to consider the propriety of establishing a "School of Art accessorial to Architecture," in consideration of the advantages likely to be obtained in a short time by the reconstruction of the Architectural Museum, and by new arrangements at the Royal Academy and University College, have hesitated to recommend at present the foundation of a "School of Art accessorial to Architecture;" but have deemed it expedient in commencing their labours not only to investigate that question, but to extend their inquiries over the whole range of architectural education.

Your committee considered that, in order to have a sound and accepted basis on which to work, they could not do better than avail themselves of the experience gained in establishing the voluntary architectural examination.

This scheme was undertaken by the Royal Institute of British Architects, the council of which body having been twice memorialized upon the subject by the Architectural Association, formally propounded the subject to the Liverpool, Birmingham, Edinburgh, Glasgow, and Northern societies, and to the Architectural Association in 1860. Upon their replies in 1861, a committee of twenty-six members of the Institute was appointed to prepare a curriculum and bye-laws. This committee, after an inquiry into the nature of the examinations held in the civil and military services, the medical and legal professions, King's and University Colleges, and the architectural schools on the Continent, submitted to the Royal Institute of British Architects a course and regulations of examination upon subjects with which it was considered that every architect should be acquainted. The Institute having given them its valuable consideration, accepted them as tests of architectural knowledge, and incurred great expense in carrying them into effect.

The Institute thus established two examinations, one in the class of proficiency, and the other, of a higher grade, in the class of distinction. The first examination took place in 1863, and twenty-two candidates have passed; nineteen in the class of proficiency, and three in the class of distinction.

The following are the subjects in which it was considered advisable to examine all candidates who presented themselves in the class of proficiency:—Design and Drawing, Mathematics, Geometrical Drawing and Mensuration, Professional Practice, Physics, Materials, Construction, and the History and Literature of Architecture.

The scheme of this examination, as is well known, has not yet achieved the success which was anticipated; but your committee, feeling that it was a step in the right direction, agreed from the commencement of their labours that any more general or complete scheme should be based on that examination, and should tend to its firm establishment. Your committee has carefully investigated the whole subject, and has arrived at the conclusion that its failure in deficiency of candidates is not due to any inherent defects in the examination, but, amongst others, to the four following important causes:—

1st. The absence of a formal certificate of having passed the examination.

2nd. The want of such a stimulus or pressure, as would make the passing of the examination professionally necessary.

3rd. Inefficient preliminary education.

4th. Want of system in architectural education.

* The committee consisted of the following gentlemen:—Royal Institute of British Architects—Messrs. W. Tite, M.P., F.R.S.; F. P. Cockerell; G. Godwin, F.R.S.; Owen Jones; A. Waterhouse; Professor T. Hayter Lewis. Royal Academy—Messrs. E. M. Barry, A.R.A.; E. W. Cooke, R.A.; P. Hardwick, R.A.; S. Smirke, R.A.; R. Westmacott, R.A. Architectural Museum—Messrs. A. J. B. Beresford Hope, M.P.; J. Clarke, F.S.A.; J. Ruskin, M.A.; G. G. Scott, R.A. Architectural Association—Messrs. L. W. Ridge; R. P. Spiers; E. J. Tarver; W. White, F.S.A. Architectural Exhibition—Messrs. W. Burges; R. W. Edis; H. Plumbe; T. R. Smith. Added by the committee—Messrs. C. F. Hayward; C. C. Nelson; J. T. Perry; J. P. Seddon; G. E. Street, A.R.A.; Sir M. D. Wyatt.

With reference to the certificate, the chief objections hitherto brought forward have been: 1st. That such certificate might be improperly used; and 2nd. That it might be possible for a student to work up the whole subject and pass through the examination without having received any practical training in an office. Now, although your committee doubt whether the first subject of the voluntary examination could be passed by any one who had not worked a long time in an office, they think that this latter objection could be remedied if a rule were laid down that no passed student could receive the certificate until he was able to produce a testimonial to the effect that he had worked for, at least, four years in an architect's office, this term to be commuted to three years in the case of those who had continued their education at either of the universities, in the Science Schools of King's College, or any other recognized body.

The first objection does not seem to have any reasonable foundation. Your committee propose, therefore, "*that a certificate be granted to all who pass the Voluntary Architectural Examination;*" subject to the above regulations.

Respecting the second question, such stimulus or pressure can only arise from such a feeling on the part of the profession and the public as would induce students to submit themselves for examination. This must necessarily be a work of time, and would naturally develop itself when a more perfect system of architectural education became established; at the same time your committee have deemed it expedient to suggest—"*That at some future period the Membership of the Institute be made dependent on the passing of the Voluntary Architectural Examination in the Class of Proficiency.*"

With regard to the third cause of failure, one which it is almost beyond the power of the architectural societies to remedy, viz., "the inefficiency of preliminary education," it is felt by many of those who take pupils, that a very large number of them come to their offices very inefficiently educated; not only are they totally unacquainted with drawing of any kind, but even their knowledge of mathematics and the elements of physics, is so exceedingly limited as to cause the greatest possible hinderance to their training in the office. Your committee, therefore, are glad to recognise the great efforts now being made by the Society of Arts and other bodies to enlarge the sphere of general education, so as to embody proper instruction in science and art; and they feel sure that these efforts will result in great service to the architectural profession.

It is, however, to the fourth reason given for the failure of the voluntary architectural examination scheme (viz., the want of system in architectural education), that your committee have given their most serious attention, because they believe that it will be possible, without incurring much expense, and without departing from the objects for which it was founded, for the Institute to adopt certain measures which, while raising the standard of the profession, will increase its own strength.

The complaint generally expressed by the students of the profession is, that there seems to be no curriculum laid down to indicate the progressive course of study by which the numerous subjects should be taken up *seriatim;* so that it often happens that at the termination of their articles or period of study they are ignorant of many of the most essential qualifications required for architectural practice. In consequence of the shortened period of pupilage and the increased number of subjects with which it is necessary that the student should be acquainted, it is found that sufficient time is not afforded for acquiring the necessary architectural knowledge by routine alone; more preliminary training, therefore, in elementary knowledge is required, in order that during the first and second years' study in the office the student should more readily understand what he is working upon, thus learn more quickly, and lose less time. It was assumed, that by establishing an examination setting forth the series of subjects with which an architect should be acquainted, and giving a list of books to be read and studied at leisure, there could no longer be any excuse for the student to say that he did not know what he had to learn, or where he could learn it. But the result has proved that books alone are not sufficient, and that without any of the progressive series of tests or examinations, such as are held in all colleges and schools, the student shrinks from taking all the subjects at one time to pass them in three days' examination. Your committee, to remedy this defect, recommend, therefore, "*that a preliminary examination be held in elementary subjects, open to all students who have been at least one year in an architect's office;*" and that those who prefer to wait for the final examination be then required to pass also in these elementary subjects.

Your committee feel that the prescription of a curriculum of study for the young architect entails very important inquiry, and is one of the most serious questions which has ever been brought before the profession.

It is objected that, of some of the subjects demanded for the voluntary architectural examination, sufficient knowledge is obviously not to be obtained in any architect's office, and it becomes therefore necessary to see whether certain courses of instruction which exist outside the profession could be made subservient to an improvement in architectural education.

Taking up the subjects of the examination, it is found, *in addition to office education*, that in *Architectural Drawing* instruction is to be obtained at South Kensington.

In *Freehand Drawing.*—At South Kensington, South Lambeth, other Governmental, and private drawing schools.

In *Elementary Design.*—To a limited extent only, in the classes of the Architectural Association.

In *Perspective.*—At the above-named schools, and at the Royal Academy to their students.

In *Mathematics, Physics, Mensuration, &c.*—Complete courses at King's and University Colleges.

In *Materials and Construction.*—At King's College in the day time; and at University College in the evening.

And in *History of Architecture.*—At University College.

With all these extraneous courses of lectures existing, your committee were surprised to find that they are taken so little advantage of; there being but a very limited number who ever attend the Governmental schools of drawing, or the courses given at University College, and hardly any the valuable courses at King's College. These latter, however, are held in the daytime; and as yet no steps have been taken to allow of pupils attending them during office hours. With regard to evening classes, your committee are of opinion that it must be accepted as a fact, that in the architectural as well as in other professions no evening courses of lectures are likely to attract many of the younger members, unless there be some more serious advantage to be derived from so doing than that of simple self-improvement: thus they consider, whether rightly or not, that such subjects as freehand drawing, construction, materials, &c., are constituent parts of architectural education, and ought to be learnt during office hours. It is the same in other professions; and the medical student would object to attend courses of lectures on chemistry or physiology if given in the evening. Your committee feel, therefore, that unless this be accepted as a fact, and opportunity be given to pupils, both in London and provincial towns, to attend certain day courses, the number of which should be recognised by the Institute, no very great improvement can be grafted on the present system of architectural education.

The next important question which your committee considered was whether any additions to, or modifications in, existing institutions could be made so as to bring them more effectually within the reach of architectural students, and improve their education. And here it is to be hoped that the Architectural Museum, in its new premises, will be able to hold out such advantages as can easily be made available. Instruction in freehand drawing from the ornamental casts of all periods and countries will be given there, and those who attend will be under the supervision of some of our first architects; whereby the objections made to sending pupils out of the office to draw at South Kensington or the British Museum will no longer hold good.

The Royal Academy, from want of room, have hitherto been compelled to withhold from architectural students the instruction afforded to painters and sculptors; but in their new premises, with a large and well-lighted room, they will be able to establish (and would doubtless be willing to do so, on the recommendation of the Institute) schools for architectural drawing, and for freehand drawing from the antique and the ornamental cast.

The complete courses of instruction at King's College are established for the special training of civil and mechanical engineers. There are, however, many architects who have profited much by attending them, and there are few subjects treated there with which an architect ought not to be conversant. The authorities of the College would probably be glad to extend these courses so as to admit of the special instruction of the architectural student.

University College has the reputation of having established the only Art Professorship in England—that of Architecture; and there is now a Bill before Parliament to enable them to establish a Faculty of Arts, in addition to those of Science and of Medicine, which they now possess. The artistic education of the architect, therefore, which is so much required, it is hoped will eventually be obtained there. They have also just taken into consideration the establishment of an engineering school, somewhat similar to that of King's College, but in which a diploma (as a sort of incentive to work) will be granted in conjunction with the Institute of Civil Engineers. It is proposed to give the diploma only to those who have worked after leaving the college for at least two years in an engineer's office, and obtained the engineer's certificate as to practical knowledge.

With the science and art schools, therefore, which will soon be established at University College, and with the lectures on materials, construction, and history of architecture, in conjunction with the practical training to be received in the office, a complete course of architectural education might be obtained. But in order to turn all this to good account, it is requisite that, with the other opportunities for obtaining architectural knowledge, it should be reduced to a comprehensive scheme, to be readily understood by architects, students, and the public generally.

Your committee believe that the British Museum, the South Kensington, and other Museums might be turned to more account towards the furtherance of improvement in artistic education, if lectures could be given on the students' days, by competent persons, on the marvellous collections of works of art contained in them. The value of a course of lectures, for instance, on Athenian sculpture, with the actual examples of the Parthenon frieze to illustrate the lecturer's remarks, could not but prove of the greatest utility.

Your committee would be most unwilling that any attempt at a centralization of architectural education in London should be made; they recommend, therefore, that, upon the adoption of this report, circulars be sent round to all the *bonâ fide* architectural societies in Great Britain, to seek for their co-operation, as their support would be needed to establish throughout the country a complete and recognised course of architectural education.

Your committee have heard with pleasure that the Architectural Association are now taking steps to establish courses of lectures on subjects specially connected with the profession, not now sufficiently provided for in office instruction, for those students who are not able to attend other courses in the daytime; and your committee earnestly recommend the Institute to co-operate with that body, and assist it in its endeavours. A course of fifteen lectures on physics and chemistry has already been established, and others are forthcoming in statics and dynamics, professional practice, geology, descriptive geometry, with practical application in the cradling and centring for vaults, &c. The committee think also that the figure drawing class of the Architectural Association, which was established four years ago, might, with the assistance of the Institute, be extended and placed on a firmer footing.

Your committee believe also that, in order to recognise and promote attendance at the courses of lectures before cited, the certificates of having passed certain examinations might be taken into account when the student presents himself for the voluntary architectural examination.

Your committee beg to recommend, therefore, to the serious attention of the Royal Institute of British Architects, as the senior and only chartered body of the profession, the following propositions:—

1st. "*That a text-book or pamphlet should be prepared, containing a complete curriculum of study for the architectural student, pointing out where and when (in addition to office instruction) courses of lectures specially pertaining to the profession can be obtained with advantage, and giving a limited number of books in which the best information is to be had in a condensed form.* In this text-book the greatest possible publicity should be given to the course of lectures which are given by our architectural professors, and to

the imperative necessity of attending schools in which any instruction in freehand and figure-drawing is to be obtained. This book should take into account the numerous honorary prizes offered by the Royal Institute of British Architects, by the Royal Academy, by University and King's College, and by the Architectural Association; it should suggest at what period these might be competed for with advantage; and, finally, it should set forth how all these courses of instruction should tend to the passing of the Voluntary Architectural Examination, which should be placed before the student as the goal to which he must of necessity attain. The committee are further of opinion that the Institute should ask for the co-operation of the Architectural Association, which, now numbering over 600 students, could materially support it in the furtherance of their scheme."

Your committee recommend that in this text-book great importance be attached to the advantage of travelling in England and on the Continent, as the best and almost the only means of becoming acquainted with the works of our ancestors, without which it is impossible to design; pointing out that those who have acquired the greatest reputations as architects and designers have done so in consequence of their knowledge, and not ignorance, of precedent.

2nd. "*That a certificate be granted to all who pass the Voluntary Architectural Examination established by the Institute, and in addition, that some especial incentive should be given by the Institute, endeavouring, if possible, to found a money scholarship for the pupil who shall pass first each year; or if this cannot be at once managed, by giving one or more medals.*"

3rd. "*That at some future period the membership of the Institute be made dependent on the passing of the Voluntary Architectural Examination in the Class of Proficiency.*"

4th. *That a preliminary examination be held in elementary subjects, open to all students who have been at least one year in an architect's office.*"

5. "*That the Institute should assist the Architectural Association to carry out the drawing school which it was proposed by that Society to establish this session.*"

And 6th. "*That an Architectural Committee be appointed, consisting of members of the Royal Institute of British Architects, of the Architectural Association, of the Architectural Museum, of the Architectural Exhibition, and delegates from provincial societies, to assist in the compilation of the text-book or pamphlet above recommended, and put themselves in communication with institutions outside the profession, to obtain their co-operation and assistance.*"

THE UNION BANK, HUDDERSFIELD, YORKSHIRE.

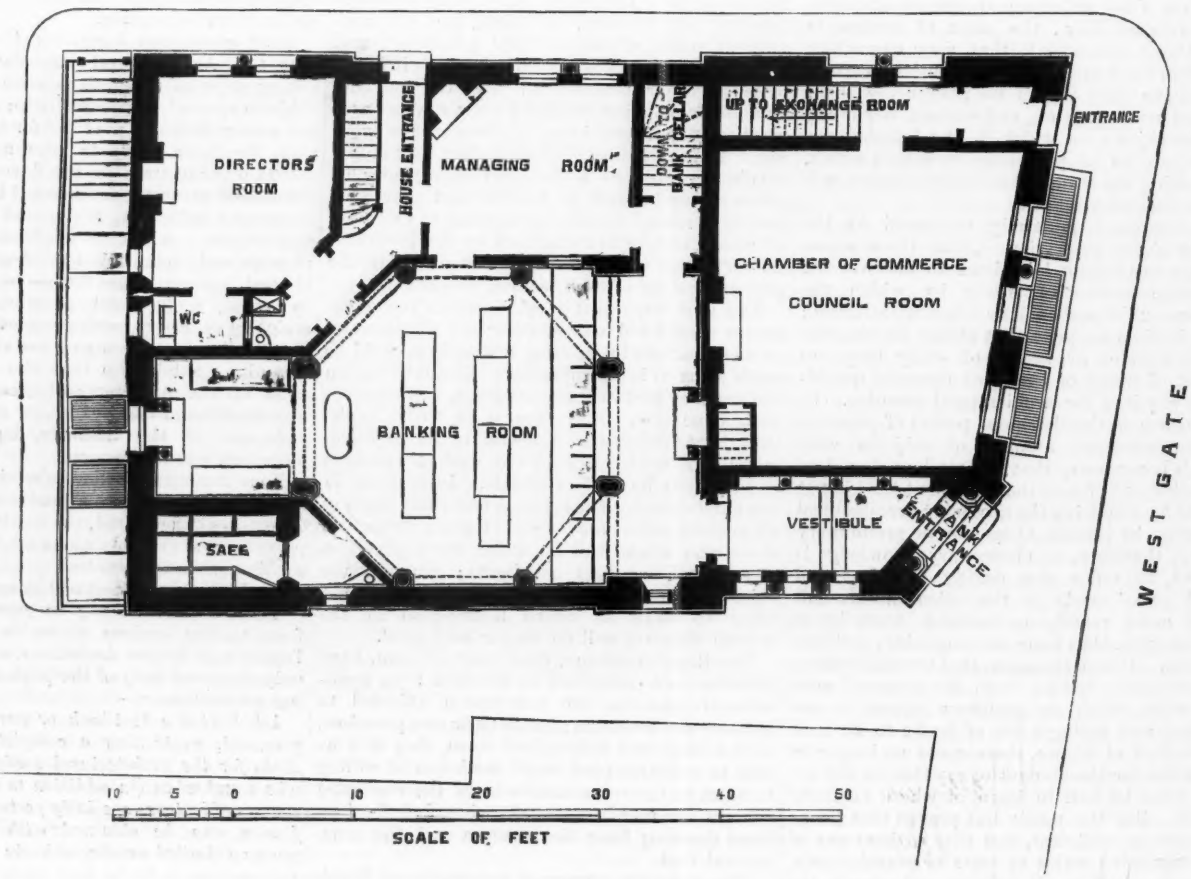
THIS building, for the Halifax and Huddersfield Union Banking Company, is amongst the most recent structures in this thriving and important town. Its erection was greatly retarded by a local strike of masons, which occurred in the summer of 1865, and lasted eighteen consecutive weeks.

Designs were obtained in limited competition from three architects in 1864, and the plans of Messrs. Paull & Ayliffe, of Manchester, were selected. The works were in great part carried out under their joint superintendence; but after a dissolution of partnership, were completed by Mr. Paull. The walls are built of rubble stone, faced with fine-tooled ashlar wall-stones, in regular courses, and lined with brickwork. The front apartments on the ground and first floors were arranged for the Huddersfield Chamber of Commerce, the upper room being used as an exchange and news-room, and the lower for council meetings.

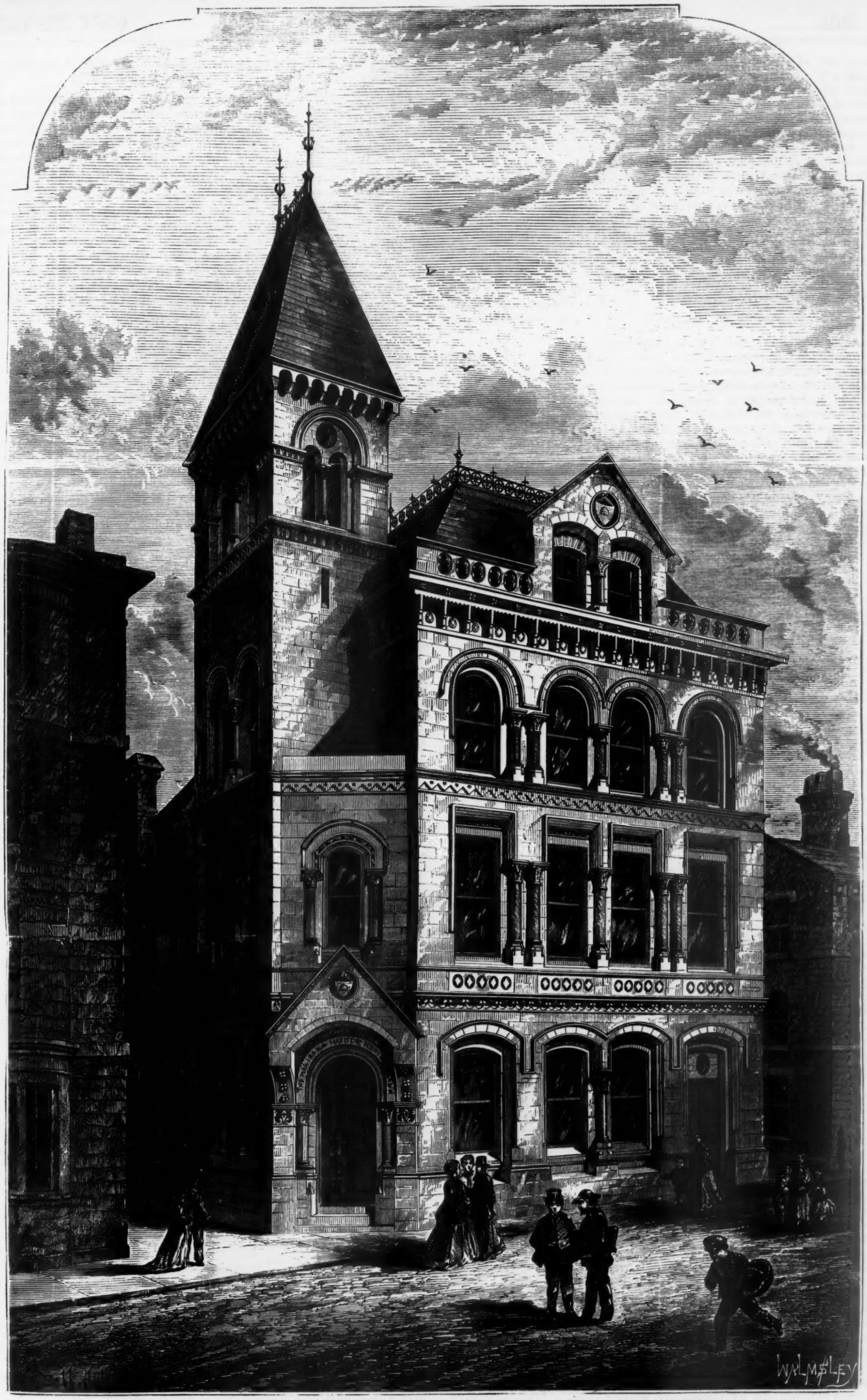
The banking-room is lighted by a dome, containing stained glass by Edmundson & Son, of Manchester. This room is octagonal. It is well finished, the columns being of Aberdeen red granite; the carved capitals and bases, &c., of free-stone; and the mouldings of Keene's cement. The fittings are executed in wainscot oak, with Spanish mahogany counter and desk tops, and ebony mountings, all arranged under the special oversight of Mr. James Bowman, of Halifax, the managing director. Vaulted cellars extend throughout the basement, warmed and ventilated for deposit of valuables, and two spacious safes are provided, fitted up with galvanized iron shelving and wrought-iron doors.

The arrangements include a residence for the cashier, the kitchen being on the first floor, same as the dining and drawing rooms, and communicating with the basement by a balance-lift. The external shafts in the elevations are from Messrs. Freeman's granite quarries at Penryn. The carving was executed by Mr. W. Green, of Manchester. Mr. Dovey, of Manchester, supplied the gas-fittings and other internal metal-work. The building was erected by local contractors as follows:—Masons' work by Messrs. Graham & Sons; carpenters' and joiners' work by Messrs. Fawcett & Sons; slating by Messrs. Goodwin; plastering by Mr. Jowitt; plumbing and glazing by Messrs. Lidster & Armitage; smiths' and founders' work by Mr. G. Scholefield; and painting by Messrs. Webster & Depledge. The clerk of works was Mr. John Gill. The cost of the building and fittings, exclusive of site, was about 8,500*l*. The internal decorative painting is to be executed during the summer of this year under the direction of Messrs. Paull & Robinson.

THE UNION BANK AND CHAMBER OF COMMERCE, HUDDERSFIELD.



Plan of Ground Floor.



THE UNION BANK AND CHAMBER OF COMMERCE, HUDDERSFIELD.

MESSRS. H. J. PAULL & O. AYLIFFE, ARCHITECTS.

RECENT WORK OF THE ROYAL ENGINEERS.

THE seventeenth volume of papers by officers of the Royal Engineers, on subjects connected with the duties of the corps, is now published.* The editor, Lieut.-col. Hutchinson, remarks that he expected it would have been enriched by a paper from Lord Napier of Magdala upon the Abyssinian campaign, but in this particular he has been disappointed. Two papers on this subject are, however, among the contents of the volume, though neither of them is from the pen of the great commander. One of these is a report by Lieut.-col. St. Clair Watkins, R.E., giving an account of the operations of the engineer department in Abyssinia, with details of all the works executed, accompanied by plans of the port, coast, depôts, camp of Zoolla, and the railway line. A stone pier, jutting out 900 ft. into the sea, with a tramway on it, and on to the beach beyond, to facilitate the landing of the army and its stores; a road, 50 ft. wide, through the jungle from this pier to the camp, 1¼ mile distant; the cleansing of the old village wells, and the construction of twenty new ones, for the watering of 2,000 men and 2,000 animals; a large store-shed; and a water-shoot about half the length of the pier, raised on trestles above the sea, for conveying to the shore sweet water condensed by H.M.S. *Satellite*, were among the first works executed, and are minutely described here. Lieut.-col. Watkins states that the difficulties of constructing a railway with unprofessional labour were enhanced by the fact of five different descriptions of rails being sent out, calling for four different modes of fixing, and that five out of ten of the fish-plate holes did not fit those on the rails. After this harassing experience, he comes to the conclusion that railways required for the operations of war should be carried out as a civil work, by engineers and contractors, who make it their business to construct them. An estimate by a contractor was given for this railway at 72,000*l.*, exclusive of rails and plant. The cost, as incurred by the Royal Engineers, was 6,000*l.*, exclusive of rails and plant. Out of this large margin the contractors would have had to supply labour and superintendence. The second Abyssinian paper relates only to the position and leading features of Magdala and its construction. Lieut. T. J. Willans describes one entrance into the place as a small double-storied hut, built of stone and mud, in which was a stout timber door, 4 ft. wide only, with a window over it for the defenders to guard it from; but the dwellings seem to have been built exclusively of wicker work and thatch. A paper relating to Prussian siege operations by Col. Lennox is of much professional interest, showing as it does the Prussian army organization, methods of construction, mining, &c. In this volume, too, are to be found the reports on the Paris exhibition, by Capt. Stotherd, describing the Austrian military equipment, system of submarine mines, telegraphic and electrical apparatus, and both naval and military visual and sighting apparatus. A sketch of the military proceedings in New Zealand, since tranquillity was restored in 1861, by Major-general Mould, C.B., has some important deductions in it. The first engineering work undertaken under the aupices of the new governor, Sir Geo. Grey, was the Great South Road, which cost 2,930*l.* per mile. The next proceeding was the construction of a court-house, for the erection of which a quantity of timber was brought to the site, when the natives got alarmed, fearing that something more than a court-house was intended, and removed the whole of it. To punish this proceeding fresh hostilities were commenced, which only terminated in 1866; and then, as we know, but temporarily. The natives resist the most urgent solicitations for the construction of roads, believing that this concession would involve their loss of right to the land. Good road-making is, however, the surest mode of conquest. The Romans made roads in Britain; the Highlanders were never settled till great roads threaded their most mountainous districts; the North American Indians are only subjugated by the pushing forward of roads through their almost impenetrable forests; and the only errors committed by Sir Henry Smith, according to the Duke of Wellington, was his omission to leave great military roads in the Kaffirs' country. The desirability of good modes of communication settled, Major-general Mould next considers the conditions under which they should be made. This able paper is accompanied by a map of the territory, a sketch of Waikato Delta, a plan of the Maori works, a plan of Paterangi, another of the native entrenchment at Picopico, plans of the most considerable Pahs, and a plan and section of Puke Hina Hina, or the Gate Pa, Tauranga, showing the maze-like system of the rifle-pits, hut dwellings, and palisadings. Besides these graphic particulars of works of military construction undertaken by the English army in foreign parts and distant colonies, there are several good papers on such miscellaneous subjects as the application of photography to surveying, revolving musket-proof mantlets, and a diagram illustrating the course of promotion in the corps of royal engineers, which we must be permitted to say appears to be very zig-zag.

* Papers on Subjects connected with the Duties of the Corps of Royal Engineers, contributed by Officers of the Royal Engineers. New Series. Vol. xvii. Printed by Jackson & Son, Woolwich, 1869.

POTTS' SYSTEM OF VENTILATION.

THE use of a hollow cornice communicating with the exterior of a room to bring in fresh air or take out foul is not an unknown arrangement. We have used it ourselves on several occasions, and at intervals ranging over some years. Nevertheless, the system patented by Mr. Potts is his own, and certainly deserves attention. In this the perforated cornice is formed into two passages, the one next the ceiling, and which communicates by valves with the chimney or other flue, is for the vitiated air, and the lower one, open to the external atmosphere for fresh air. The latter is not perforated near the entrance, so as to give the air a direction along the channel. We have seen the cornice in a billiard-room, where it is found very serviceable. The size of the channels, of the perforations, and of the openings of entrance and exit must of course be apportioned to the size and purpose of the apartment. Mr. Potts forms the cornice of various materials: zinc, or sheet brass, usually; sometimes partly of plaster, especially where old cornices are to be converted. Some houses in Kew and some taverns in the City are being provided with these ventilating cornices, and there is little doubt that as the value and simplicity of the system become known, it will be more extensively adopted. It is likely to be tried, we are glad to hear, in the Justice Court at the Mansion House.

CHURCHES IN DEVON.

Clyst St. Mary Church.—This church was reopened on Easter Sunday after works of restoration. It had suffered almost a travestie in some alterations made more than thirty years since; Italian windows, cornices, &c. having, together with a thick coating of cement over the exterior, effectually disguised the originally Gothic church. The present improvements consist in inserting four traceried windows, one of which, in the chancel, has been filled with stained glass by Messrs. Lavers, Barraud, & Westlake. Some new open seats have been constructed, also a pulpit of wainscot, the chancel arch restored, and the avenues laid with Minton's tiles. The ceilings, of cradle form, have been divided into compartments, with ribs and bosses; copings and crosses erected on two gables. The works have been carried out through the exertions of the rector, Rev. S. Warner, under the superintendence of Mr. Ashworth, architect, by Messrs. Moass & Sons, builders, of Exeter.

Bishopsnympton.—The parish church has been reopened for divine service, after considerable works of restoration. The work was commenced in July last, and the outlay has amounted to about 1,300*l.* The chancel has had a ceiling removed and the roof for the most part renewed, the old principals and arched braces doing duty in an open boarded roof. A new reredos of Bath stone has been erected at the east end; and a new two-light stained glass window from Mrs. Beer's establishment has been erected to the memory of the late Rev. Canon Heberden. The south aisle has had its cradle-roof uncovered, repaired throughout, and reslated, and carved bosses fixed at the intersections of the ribs. Three new Bath stone windows have been put in, and the west wall rebuilt. The nave roof, a cradle plastered between the ribs, has been adorned with carved bosses. The church has been reseated throughout with red deal open seats, the bench ends and fronts having tracery. The plastering has been removed from the walls, and the whole interior exhibits the stone, having pointed joints. Two old windows on the north side have been repaired and reglazed. The floors of the avenues are laid with Haywood's black and red tiles. The font, a Norman one, has been restored by supplying four shafts in Purbeck stone. The tower of the church requires much repair, which has yet to be undertaken. The Rev. J. Thorne, the rector, has been the chief promoter of the work, aided by contributions of friends, the Bishop of Exeter giving to the amount of 500*l.* The work has been carried out, under the superintendence of Mr. Ashworth, of Exeter, architect, by Mr. Cock, of South Molton, builder; the Bath stone work by Mr. Gould, of Barnstaple; the stone carving by Mr. Hems, and wood carving by Mr. Sendell, both of Exeter.

NOTES FROM PARIS.

THE exterior of the New Vaudeville Theatre, at the corner of the Boulevard des Capucines and the Rue de la Chaussée-d'Antin, is a simple semicircular pavilion, planted between two high mansions. M. Magne is the architect of this building, which does him much credit. The inside decorations are completed, the colouring being of a very harmonious clear tone. There is a profusion of gilding; but it is used to such good advantage that it does not appear tawdry or out of place. The lighting is a sort of partnership of the sunlight and the open chandelier; in fact, it is obtained by a lustre in demi-relief. On the front of the stage the footlights consist of a new species of burner invented by M. Subra, which he calls reversed-flame burner (*bec à flamme renversée*), every light being under a glass shade unopen at the top; so that there is no possibility of the dress of an actress taking fire from that cause. Similar lights, our readers know, have been used in England. The ceiling has four allegorical paintings by M. Mazerolles—Folly, Music, Drama, and Tragedy. Their conception is very poor, some jovial figures being seated on clouds and likely to fall through; still, it has a moral which the author never dreamed of; for how many new dramas and *opéras comiques* have lately fallen through the happy clouds and *rêves* of a good reception never to be lifted to the skies of public favour! We may add that the circular *foyer* of this theatre is charming; the machinery in the house is of first-rate conception and power, and is worked by a six-horse power engine.

The ancient Vaudeville, on the Place de la Bourse, now in course of demolition, afforded much amusement to the *dilettanti* during the removal of the pieces of machinery, some of which are of large dimensions. The principal doorway had to be enlarged by taking down a portion of the walling.

The new Opera proceeds slowly but regularly, all hands being employed (there are not many) in putting the *salle* into shape for the decorators, and in finishing the dome. The façades are terminated, except the crowning statues, which have yet to be raised. There were circular refuges and candelabra facing the Opera, and in a line with the two footways of the Boulevard. These have been suppressed, and four others of smaller dimensions on each side of the axis of the Opera, two on each side of the Boulevard, substituted.

A few days ago the fifth pavilion of the Halles Centrales, intended for the sale of offal, was formally opened to the public. This pavilion completes this magnificent construction, the most perfect of all the establishments of this class throughout the world. To the first emperor is due the idea of the general reform of the Halles Centrales, a project the execution of which was only commenced in the reign of Louis Philippe, under the administration of M. de Rambuteau, whose name is affixed to a wide and well-built street leading from the Rue du Temple to the Halles. The excellent arrangements and magnificent structures which now form the group are, however, due to the actual administration, and the sum of money expended up to the present day, so as to complete the structure, has been 2,400,000*l.* To M. Victor Baltard, municipal architect, is due the creation of the special style of architecture, so completely and so perfectly applied to the modern exigencies of the supply, on an immense scale, of wholesome food of the best quality.

According to official returns, in 1816, Paris contained 710,000 souls; in 1826, 890,000; in 1836, 909,000; in 1846, 1,053,000; in 1856, 1,174,000 (at this period the population inside the fortifications was 1,525,942); in 1866 (after

the spread of Paris to the fortifications), 1,825,274.

From a statistical return just published, we find that the first omnibus circulated in Paris in 1652 by letters patent granted to the Duke de Roubane, the Marquis de Souches, and the Marquis de Crenau. During 1868 the General Omnibus Company had in service 694 carriages. Each performed, on an average, 91,260 mètres; this, for 682 omnibuses daily at work, gives 22¼ millions of kilomètres for the entire year, or about 13½ millions of miles. The number of effective horses in stable was 8,227 per day; 12 were daily yoked to each of the 682 omnibuses; the average mileage done by each horse was 9·6 miles. The number of passengers conveyed during 1868 was 113,348,041. In Paris and the annexed communes the company possess 43 stables, coach-yards and forage-stores, and 4 carriage workshops: these latter, in 1868, employed a staff amounting to 591 men per day, the daily wages being, on an average, 4f. 53c. 18m., giving an annual amount of wages of 32,155*l*. The whole working expenses of the company for the year amounted to 881,974*l*.; receipts, 928,824*l*.; profit for the year 1868, 46,850*l*. This, at 4 per cent., would represent a capital of 1,171,250*l*.

At the Louvre, on the four sides of the Salle des États, up to a convenient height, have been arranged nearly three hundred paintings of the Dutch and Flemish masters. This collection is a most valuable one, and appears to be worth at least half a million sterling. Owing to the loud complaints of artists and amateurs of all classes, the pictures temporarily stolen from the galleries of the Louvre have been given back to their rightful owner, the public. Now it is the turn of the miniatures. The portraits of Saint-Mégrin and of Balsac d'Entragues, of Sainte-Geneviève, and other marvels of the Savageot collection, have already reappeared in the Miniature Gallery. They have been wisely placed in a shady spot, whereas, exposed to the sun in their former place, many of these valuable pieces were being spoiled.

On the 1st of May the hawthorn kept up its annual name by showering into the streets of Paris cart-loads of "*Mai*," as the French call it also. Hundreds of hand-carts circulated for some days, laden with single white, single red, and double red, the latter being a most profuse clustering of microscopic roses. Every workman could provide himself, for one sou, with a branch 3 ft. long, and, at the present moment, every young girl can have a respectable bouquet of lilies of the valley for the same sum at any of the markets. As these come from the provinces, the quantities of may and muguets brought in daily by train to Paris must this year have been enormous.

STEAM POWER IN LAND CULTIVATION.

AN opportunity has been afforded by Mr. Webb, of Smallwood Manor, near Uttoxeter, of seeing in operation on his own estate the latest improvements in the application of steam power to the drainage of clay soils. He has just obtained from Messrs. Fowler & Co., of Leeds, a set of double engine tackle for ploughing, cultivating, and draining. The engines are of 14-horse nominal power, fitted with a large drum underneath the boiler, on which the steel rope which draws the implement is wound. For draining, double power is obtained by the wire passing over a pulley mounted on the frame of the draining plough, the opposite end being secured to the wheel of the engine, so that the rope travels at twice the speed of the plough. A draining plough made by Messrs. Howard, of Bedford, at work at Swansmoor, near Weston, is similar, except that the steel rope, instead of being drawn round a snatch-block in front passes round a large pulley on the frame. The plough on the first day of trial, says our authority, the *Staffordshire Advertiser*, did its work admirably. The mould which forms the drain is 4 in. in diameter, pointed in front, and is connected with the frame of the plough by a flat bar of steel, which cuts its way through the ground, the small orifice being closed again by rolling. The field in which the draining was first performed had been previously drained by pipes in the furrows, and the steam draining plough was used to run drains along the ridges. One advantage attending the use of the implement is that the land on each side the drain is slightly raised for a considerable distance, which admits of the aëration of the soil, a very important matter in heavy land. The drains were cut through in several places, and in each case the opening was found to be perfect, and the inside firm and smooth. The drains are run at a depth varying from 2 ft. 3 in. to 3 ft., and the work will be done in the neighbourhood at 1*l*. an acre, the drains being 16 ft. apart. We understand that in parts of Essex, where Mr. John Fowler conducted his first experiments fifteen years ago, the drains then formed in this way are as perfect as on the day they were made. It is hardly necessary to say that this mode is only applicable where the drain passes through a retentive stratum of clay. The cost of a pair of these engines, with all the tackle for ploughing, cultivating, and draining, is 1,600*l*. They require five persons to attend to them, and will drain from eight to ten acres per day, at the depth and distance apart stated above. The tackle was drawn by its own power from Uttoxeter to Smallwood Manor, along a road which has several steep hills, with perfect ease.

From 10s. to 18s. an acre was charged for ploughing or cultivating, going once over the ground, and from 16s. to 30s. for going over twice the depth, the nature of the soil and other circumstances determining the price. Mr. M. T. Bass, M.P., at the suggestion of Mr. Webb, joined the enterprise a few years ago. Two sets of their apparatus are stationed at Sleighford, in the northern part of Lincolnshire. Not only have the partners thus increased their plant, but many others in the district have been induced by their success to purchase the apparatus, and about thirty sets of Messrs. Fowlers' double engine tackle are at work in Lincolnshire and Nottinghamshire. As the farmers become convinced of the value of the implement, and can reckon with confidence on getting their land worked by it, they are able to dispense with a large number of horses, and to effect a considerable saving, as well as to secure more efficient cultivation. It is the perfection to which the draining plough has been brought that has induced Mr. Webb to make another effort to try whether the apparatus cannot be profitably employed in the grazing district in which he resides.

The men employed by the firm of Fowler & Co. have from time to time clubbed their savings, and bought a set of tackle. The largest proprietor has gone out with it to a promising place, and hired it out, dividing the profits after receiving wages for himself. In this way no less than twenty sets of tackle have been purchased, and are now at work. A plan of introducing steam cultivation has been proposed, and is shortly to be put into operation, based on the following principles:—A steady, industrious man, of good sense and good character, is to be put in charge of a machine, receiving moderate wages, and after paying interest on the cost, the profits are to be equally divided, half to go to the purchaser and half placed to the credit of the man until the amount will repay the cost, when the apparatus will become his property. In this way his interest would be strongly enlisted in the work, whilst the purchaser has the security of possession for the original cost, interest on the outlay, and a share of the profits. No particular mechanical ability, it seems, is necessary.

It is a matter of surprise that so promising an investment as that offered by steam cultivation should be so little regarded, and it can only be explained by the early failures, and by the want of proper care in the selection of apparatus, and of prudent management in recent attempts to introduce it.

THE TRADES MOVEMENT.

Liverpool.—A correspondent writes: "It may interest you to know that the masons have determined to resist payment by the hour in this town and district, and that in consequence a general strike (called by them a lock-out) will take place here on Saturday next. The works affected will be very few in number, and the stoppage of little consequence. Trade was never known to be so bad in Liverpool in the memory of man."

Sheffield.—At a meeting of the associated masters in the building trades it was stated that an advertisement for men, which had been inserted by the masters in the local and other papers, was being freely answered. It was likewise stated that no difficulty had as yet been experienced by the masters who were in favour of the hour system, as they had sufficient men in all classes of the building trades to enable them to carry on the work which they had at present in hand. In order, however, to guard against the possibility of their being in want of men, a deputation had been sent that morning to London, to arrange with Colonel Maude, of the Free Labour Society, for the sending down a number of men who were willing to work according to the system which the associated masters are desirous of introducing.

Stockport.—The dispute between the joiners and builders of this town, we are glad to say, is likely to terminate satisfactorily to all parties, the operatives being disposed to accept their employers' proposition of being paid by the hour. The only point waiting for arrangement now is the rate of wages for over-hours and the unprotected work in the winter season, which, there is reason to believe, will be amicably settled.

St. Helen's.—Mr. Harnett, general secretary of the Operative Stonemasons' Association, reports that the dispute at St. Helen's has been arranged, and that eighteen men out there had returned to work on the old terms.

Holland.—Strikes are beginning to be prevalent in Holland as well as Belgium. One is reported at Amsterdam. The ship-carpenters declined to continue work unless the masters would increase their wages from 1·80 fl. to 2 fl. a day, the working hours to be henceforth from six in the morning till six in the evening. The masters, however, refused these proposals, and the workmen have left the yards. Eight hundred men are now out of employment. The turf-cutters at Beets (Friesland) have also struck for higher wages. Here serious disorders have taken place, and some lives have been lost. The Dutch workmen want to expel the Belgians, who work for lower wages. The Dutch printers are organizing a league to obtain higher pay.

Berlin.—A Berlin letter says,—The house-carpenters here are still out on strike, or at least a great many of them. A large public meeting of working-men was held here on Sunday week. Upwards of 3,000 persons attended it, and the speakers, who were of all trades, encouraged the carpenters to hold out. Two resolutions were passed, of which the first was to the effect that it was the duty of every working-man to help his fellow-workmen in their struggle with capital; and the second, that as the North German Parliament consisted of Conservatives and capitalists, the working-men could not hope for any aid from them, and must therefore endeavour at the next election to secure the return of their own representatives.

Manchester and Salford Building Trades Institute.—The annual meeting of the members of this Institute for Technical Education has been held. There was a very numerous attendance, and the chair was occupied by Mr. Isaac Holden. Suitable addresses were delivered by the chairman and other gentlemen present. The report was read by Mr. John M'Lean, the secretary. The committee, in presenting their first annual report, state that, at the commencement of the movement, the objects of the institute were confined to the trades of carpenters and joiners, but it had been afterwards resolved to connect the building trades. The number of members for the past year had averaged 62 per quarter—58 carpenters and joiners, and of whom twenty were apprentices, three masons, and one a bricklayer. The students had generally shown their appreciation of the instruction furnished, by their regular attendance and diligence throughout the season. The committee, however, could not withhold expressing their opinion that the number of students for the first year had been very few compared with the number of members, and the importance of the building trade, in this locality. The total amount of subscriptions for the past year had been 28*l*. 5s. 0½d.; the expenses, including hire of rooms and teachers' salary, with other items, 41*l*. 3s. 6d.; leaving a deficit of 15*l*. 9s. 0½d.

Co-operation at Deptford.—A committee of workmen recently discharged on the closing of Deptford Dockyard has been formed to draw up the rules of a Co-operative Association, or partnership of industry, to carry on the trades of shipbuilding, ship-repairing, and ship-breaking in the unoccupied yard. The co-operation of several influential tradesmen in the locality, besides members of Parliament and others (among the latter being Mr. T. Hughes, M.P.), has been promised. The Government have expressed a willingness to treat with the men for the occupation of the yard on liberal terms, and the Admiralty have now a memorial from the latter before them, asking that the old and useless ships of the navy be sent to Deptford for breaking up.

RAILWAY MATTERS.

THE Sheffield station of the Midland Railway is progressing rapidly towards completion. The whole of the station, both on the up and down line, will be covered in, and the span of the roof will be something more than 115 ft. On the down side of the line, which is the side nearest the town, the station will be 426 ft. in length, and the platform will be about 150 ft. longer at either end. The centre of the building will be set apart as booking-offices. On either side there are large waiting-rooms for the three classes of passengers, and a first- and a second-class refreshment-room. The station on the up-side will not be so long as the other, but it will contain a refreshment-room, booking-offices, and waiting-rooms. Both the up and the down platforms will be about 30 ft. wide. It is not intended to erect a goods station, as the one at present in existence will still be used, and most of the goods traffic will be run over the old line to Masbrough and thence to Sheffield. The building on the down-line is nearly completed, and workmen are now engaged in fixing iron girders for the support of the roof, and in erecting the platform walls. The station on the up-side is not so far advanced. The site of the station is between Granville-street and Pond-street. The whole of one side of Granville-street has been pulled down to meet the requirements of the company; whilst on the Pond-street side, rows of cottage property have disappeared to make room for the entrances. The station will have a large open space in front, so as to accommodate cabs and other vehicles. That side of Granville-street which has been pulled down to make way for the line is supported by a wall stretching from the mouth of the tunnel nearly up to the top of Broad-street. Most of the station itself stands upon arches. The buildings are entirely of stone, and what architectural features they have about them are in the Italian style. There will be two chief approaches to the station, the most important being that which will commence in the Old Haymarket, near to the site of the new Post-office, which will occupy the eastern side of the approach. This approach will be 60 ft. wide, and will have an easy gradient to the station.

Much light is thrown on the interesting question whether railway travelling is injurious to health, by the statistical investigations of Dr. Wiegand, of Halle. His inquiries are based on the reports of thirty-eight companies, and the results for 1868 are as follow:—Of 11,125 engine-drivers, stokers, and other officials travelling with the train, 119, or 1·072 per cent., died; while of the 43,853 other officials employed only 408, or 0·931 per cent., died in the same period. It will be seen that the rate of mortality is somewhat higher in the first than in the second class, but the difference is not great enough to lead us to suppose that the occupation is more than usually dangerous or unhealthy.

MALTHUS AND THE POPULATION QUESTION.

THE National Association for the Promotion of Social Science met last week in the room of the Society of Arts, Mr. Newmarch in the chair, when Mr. W. B. Hodgson, LL.D., read a lecture on "Population."

Dr. Hodgson said that it was to be regretted that the ideas of Malthus were always appealed to on this question. Distress and destitution were not by any means to be found on the increase in proportion to the density of population. On the contrary, in many thinly-populated and fertile countries distress was much greater than in others which were as fertile, yet more densely peopled. Destitution was almost universal in thinly-peopled countries, even where the influences of climate and soil were favourable, while abundance might exist in countries densely peopled even without a fertile soil. No doubt the number of the rich and of the poor would be in proportion to the paucity and the density of the population. The application of the abstract theories of Malthus was, in fact, practically senseless at the present time, for the world was yet a long way from being under cultivation either to the extent or the degree which might be reached, and it was therefore unnecessary to reason on the results of an over-population which might never exist, and which, in any case, could only be anticipated in a very remote future. The present distress and scarcity were not due to over-population, but to over-speculation. In Canada the want of population was preventing the development of the resources of the country. At the same time Dr. Hodgson admitted that it was the duty of parents to exercise due consideration, and to act with a due sense of their responsibilities, and not marry without some provision; for it was clearly wrong to bring up large families of paupers to be burdens on the community. The only remedy, however, which was possible seemed to be the diffusion of correct views on the question of individual responsibility, to which it must be left.

A discussion followed, in which the speakers seemed to be about equally divided, and a vote of thanks was unanimously given to Dr. Hodgson, who, in thanking the meeting, said he was of opinion that Malthus and his theories should be put aside altogether. The surface of the earth was not infinite, but it was not exhausted, nor all cultivated as yet, and it was unnecessary to speculate on a condition of things which might never arise. A large portion of the earth was now ready for cultivation, and general over-production was impossible. A large portion of the population grew up without being able to render any aid to society, and these must be taught the necessity of adding to the wealth of society instead of diminishing it. If we could qualify the mass of society, and make them all producers, we should not only make them all useful, but comfortable.

THE ARCHITECTURAL MUSEUM.

THE honorary secretary writes,—I should be glad to let those who are interested in the museum know, through your columns, that we are now busily engaged in arranging our collection. The task of sorting and finding suitable hanging-space for the various objects in so large a collection occupies, it is found, a longer time than was at first anticipated. Hence a slight delay has arisen, for which I should be glad to explain the cause to the public: and here I would remark that it is felt by those who are carrying on this work, that considering the advantages gained by architects for an annual guinea, and the very disinterested way in which art amateurs have come forward, we may fairly look for more general help from the profession.

STAGE NOTES.

The General Theatrical Fund Dinner.—The twenty-fourth anniversary festival of this excellent charity was held on Thursday evening, the 13th, at the Freemasons' Tavern, under the presidency of Mr. Angiolo R. Slous. Few recent anniversaries of this or similar institutions have passed off with more *éclat*, or have been more satisfactory in every respect. Mr. Slous made several admirable addresses, especially, of course, that in advocacy of the fund. To this, Mr. Buckstone responded in an amusing address, ending with the suggestive remark,—"When the stewards wait on you with their subscription-papers, write your names plainly, and let your figures be large." In reply to the toast, "The English Drama," Dr. Doran responded in an eloquent speech, a mixture of amusement and information, wit and pathos. Mr. Cullingford, the secretary, announced the subscriptions as 400*l*. The presidency of Mr. Slous will be remembered.

Princess's Theatre.—One of the most charming landscape scenes that has been exhibited for some time has been produced by Mr. F. Lloyds, for the new drama, "Presumptive Evidence," in which Madame Celeste is now playing at this house. The scene represents a cornfield in bright sun-light, a river, with bridge and other accessories, running near. It is as good as one of Vicat Cole's best works magnified.

Fluvial Realism.—A real river is to be introduced into the Munich Theatre in Wagner's "Rheingold." One of the scenes represents the Rhine (real water) flowing through a luxuriant country. Suddenly a nymph plunges into the water, and swims across the river to a rock. Mdlle. Mallinger, who is to perform this feat, is now taking lessons in swimming!

Another Theatre Burnt.—The Flora Theatre at Cologne has been totally destroyed by a fire which broke out just after the performance had been concluded. The catastrophe is supposed to be the work of an incendiary, and the more so that the Grand Theatre was burnt to the ground a few months back under similar circumstances.

The New Opera House at Vienna.—This building, although not yet completely fitted up, has just been inaugurated in presence of the imperial family, the ex-King of Hanover, Counts de Beust and Hohenlohe, the Duke de Gramont, and nearly all the foreign ambassadors. The house is lighted by an illuminated roof, as in some of the theatres of Paris.

CAMPANOLOGY: PEALS OF TWELVE BELLS IN ENGLAND.

THE following list of twelve-bells peals is fuller than that published in "N. & Q." 3rd S. iv. 96. I give the date, the weight, and note of the tenor, also the founders. The earliest *ring* was at York Cathedral, dated 1681.

Date.	Churches.	Founders.	Weight. Cwt. q. lb.
1681.	York Cathedral Church. Melted down to a peal of ten, 1765, by Lester & Packe, of Whitechapel. Destroyed by fire 1829, after which a new ring was cast by Mears in	Ancient.	63 0 0
1844.	... ...	C.	53 3 0
1715.	St. John's, Cirencester.	Rudhall.	D. 28 0 0
1719.	St. Bride's, Fleet-street.	Ditto.	D. 28 0 0
1724.	St. Nicholas's, Liverpool.	Dobson.	C. 41 0 0
1726.	St. Martin's-in-the-Fields.	Rudhall.	D. 28 0 0
1729.	St. Michael's, Cornhill.	Whitechapel.	C. 41 0 0
1731.	St. Mary's, Painswick. (Two trebles added in 1821.)	Rudhall.	D. 28 0 0
1735.	St. Saviour's, Southwark.	Knight.	B. 52 0 0
1739.	St. Leonard's, Shoreditch. (Two trebles added in 1823. Tenor cracked by clocking, February 27th, 1860.)	Whitechapel.	D. 30 0 0
1770.	St. Mary's, Cambridge.	Whitechapel.	D. 30 0 0
1771.	St. Martin's, Birmingham.	Ditto.	D. 36 1 24
1775.	St. Peter's Mancroft, Norwich.	Ditto.	C. 41 0 0
1787.	St. John's, Halifax (13 bells).	Ditto.	E. 25 0 0
1787.	St. Giles's, Cripplegate.	Ditto.	D. 36 0 0
1798.	St. Chad's, Shrewsbury.	Ditto.	C. 41 1 0
1828.	Quex Park, Isle of Thanet.	Ditto.	F. 15 0 0
1830.	St. Mary's, Oldham.	Ditto.	C. 30 0 0
1841.	St. Peter's, Leeds (13 bells).	Ditto.	C. 36 0 0
1847.	West Bromwich (13 bells).	Ditto.	E. 23 0 0
1867.	St. Mary le Tower, Ipswich.	Warners.	C *sharp* 30 2 0
1868.	St. Peter's, St. Alban's, augmented by	Warners.	E. 23 0 0
1869.	Worcester Cathedral Church. (In the moulds.)	Taylor.	D. 49 0 0

The advantage of an extra bell, as at Halifax, Leeds, &c., is, that the key may be occasionally altered from a *major* to a *minor*, when less than the full number of twelve are rung. The grand *ring* of ten at Exeter Cathedral is most remarkable for this clever arrangement. It is to be observed that a *ring* of bells was the old phrase for a set of bells, and not a peal; this latter word being applied to the performance of ringing, whether one bell or more; and among change-ringers it means the performance of the full number of changes which may be rung on a given number of bells: a less number of changes is called a *touch*. H. T. ELLACOMBE, M.A.

HAND-PAINTED TILES FOR SURFACE DECORATION.

IN the Paris Exhibition of 1867 there were exhibited by the French Imperial Manufactory at Sèvres two ceramic pictures, painted by the well-known artist Yvon, each composed of several pieces of earthenware, each piece having been painted and fired separately, and afterwards combined into one large slab; with a mosaic system of joints, similar to that ordinarily employed for stained glass, so arranged as not to interfere with the leading forms of the composition. These pictures, which have been purchased by our Government, and which are now in the South Kensington Museum, suggested to Messrs. Simpson & Sons the idea of applying a similar method of vitreous painting to the tiles manufactured by Messrs. Maw & Co., such as are in ordinary use, as a means of general decoration at once artistic, perfectly durable, and suitable alike for interior and exterior use.

They have now succeeded in perfecting the process, and have issued lithographs of the designs they have prepared. Some of their specimens are highly glazed, while in others the surface is perfectly free from gloss, and resembles fresco-painting. The range of colours available for this description of work is very extensive; and as it is applicable for designs in all styles, it should be largely employed.

Its cost, they say, would approximate to that of ordinary mural painting of a like character, with the expense of the tiles and burning in of the painting superadded. This is vague: the expense of mural painting is regulated by the terms of the artist employed; and so with these wall tiles, as the Messrs. Simpson lay themselves out to execute the designs of architects and

others who may desire their co-operation. Using designs already in hand, 1*l.* per foot is spoken of; and if ordinary encaustic or other cheaper tiles be used in conjunction with the hand-painted tiles, in the shape of borders and filling-in, the cost per foot of covering any given surface will, of course, be lessened.

The great point, however, is to obtain good art: it is not desirable to make a bad design permanent; and a pound a foot, unless it furnish something charming to look at, would be all too dear.

We quite agree with Messrs. Simpson in believing that ceramic painting will hold an important place in decoration hereafter; the current is setting that way; and we heartily wish them success in their praiseworthy endeavours to forward its introduction.

ON THE IMPORTANCE OF AQUEOUS VAPOUR IN WARMING AND VENTILATING DWELLING-HOUSES.

MR. CHARLES M. WETHERILL, PH. D., M.D., professor of Chemistry in the Lehigh University, of the United States, has written a paper on this subject, in the Journal of the Franklin Institute, in which he offers the following suggestions to practical men for an improvement in furnaces:—

"1. Cease improvements of the stove, making it more complicated and expensive, and saving both coal and the trouble of charging it, until a good water supply capable of being regulated is obtained. This would not prevent the supply of moisture to any such complex furnaces if they be preferred.

2. Save the coal, as is done, by dampers in the fire flue and register, in the ash-pit and stove-door. Also, by attention to the quantity of air passing through the hot-air chamber governing it by dampers in the hot-air ducts near the stove, and in the cold-air ducts; paying also great attention to the air leaving the apartments, and regulating it as much as possible.

3. Seek some method of adding steam by the action of the fire, and in regulated quantities under control, to the hot-air chamber. Perhaps the water tromp for obtaining a blast by the fall of water or the atomizer may be made available. Perhaps some means for the evaporation or atomization of water in the apartment may render assistance in maintaining the proper relative humidity.

The admission of steam to the hot-air chamber does not rest upon theory only; it has been carried out in practice by Professor Henry at his dwelling in the Smithsonian Institution. 'An iron tube connected with the water vessel in the hot-air chamber, was inserted through the side of the furnace into the midst of the burning fuel;' this device kept the water in the vessel in a state of rapid ebullition, raised the relative humidity of his apartments, and a quality of 'softness and salubrity were imparted not before perceived' in the air."

The paper is accompanied with sketches representing a vertical and a horizontal section of a furnace improved for hydration. The supply tank, with ball-cock, the author remarks, may be placed inside of the air chamber, providing for an overflow through the wall. The water back should not be in the fuel, and devices should be present to prevent unpleasant results from derangement of the water apparatus. The water must *boil* at the rate of a gallon, or more, per hour, according to the ventilation, for a moderate dwelling.

Taking 100 as the saturating point, the atmosphere, he calculates, should be hydrated to a standard, ranging between 50 and 75, or to a mean of 67·5.

With respect to the rate of the renewal of the air, he says, "it has been found necessary in the halls of Congress to change it every eight minutes, *i.e.*, seven times and a half each hour. This rate would not be required for an ordinary dwelling-house, nor could it be effected without powerful means; it would need the evaporation of nearly eight gallons of water per hour."

THE SUPPLEMENTARY EXHIBITION OF PICTURES OF 1869.

A COMMITTEE has been formed to arrange the proposed exhibition of a selection of the pictures returned by the Royal Academy, including the following names:—

Messrs. Samuel Solly, F.R.S.; George Chester; the Very Rev. D. Rock, D.D.; Dutton Cook, Mark Lemon, Captain J. W. Clayton, E. A. Foley, G. A. Sala, Frederick Chester, T. J. Gullick, T. Stuart Smith, C. J. Dumphie, Alfred Thompson, Walter Thornbury, Alexander W. Macdougall, J. A. Sterry, J. W. Benson, John Hollingshead, A. Harvey Moore, Walter Severn, A. Baccani, R. Sayers, Charles Prater, Edwin A. Pettitt, Charles Drury Fortnum, Frederick Smallfield, A. C. Stannus, Henry Weekes, &c.

The works of art, it seems, will be received at the Old Bond-street Gallery, from Wednesday, 19th, to Saturday, 29th instant, inclusive. It is proposed that the exhibition shall open early in June, and remain open until the 31st of August.

PARLIAMENTARY ART-PHOBIA.

SIR,—May I be permitted to continue the subject so forcibly commenced in your number for May 1st, by selecting a short extract from those voluminous reports of the Irish Church debates, in which a topic of much interest to architects might possibly remain buried out of sight from some of your readers? It appears that Mr. Gladstone had purposed to set aside funds for the maintenance of some important monumental churches, not to exceed twelve in number; but in compliment to the superior (?) taste and judgment of a British House of Commons, had consented to forego that purpose. On May 13th Mr. Vance proposed and Mr. Scourfield seconded a clause of similar tendency to the omitted clause, whereupon (I quote the newspapers of last Friday), the Attorney-general for Ireland said that the proposal of the hon. member for Armagh could not be maintained for a moment. The negative had already been decided in one of the fullest Houses of the session. Mr. B. Hope supported the amendment, which was negatived without a division.

G. M.

REGISTRATION OFFICE FOR WORKMEN.

SIR,—I was much pleased at seeing a letter from "A Builder" on the above, and am sorry that so little notice has been taken of it. More so as it is generally acknowledged that the mode of engaging workmen in the building trade is clumsy and unsatisfactory. I have heard very able men lament because there was not an office similar to that proposed by "A Builder." I have spoken to several men, and they agree as to the necessity of some better method for communication between masters and men. It is well known that work in the building trade is uncertain, and that but few are kept as constant hands. Busy one month, slack the next, and for that reason a large number are always seeking employment. A registration office would be a great gain, and save both parties much valuable time.

The associated workmen and the frequenters of public-houses have an advantage in hearing of jobs over those who are not members of the first, and who do not attend the others. My employer being slack, I had to look for work; and I agree with "A Builder" that nothing is more disheartening than looking for work in London. I think it would be easy to form an office, and, if supported by employers, I feel sure that a large number of men would try to make it a success.

JACK PLANE.

CO-RELATIVE STRENGTH OF BUILDING MATERIALS.

I SEND an extract from the *Times* of the 7th inst., which may have escaped the notice of those who are unaccustomed to read the result of the experiments tried with guns at Woolwich, but which are always interesting, and in this instance instructive to builders and architects. The test was to try the powers of endurance of a 9-in. wrought-iron gun, with a battering charge of 43 lb. of powder, 1,114 rounds being fired; with the maximum penetration, as laid down by the Committee on Fortifications, as follows:—"Into earth, 40 ft.; into concrete, 12 ft.; brick-work, 12 ft.; rubble masonry, 12 ft.; massive granite, 2 ft. (but with a fracturing and disintegrating effect to a much greater depth and over a considerable area); into iron plating, 11 in."

This is doubtless the severest test to which the relative strength of such materials can be subjected; and whilst giving a large pre-eminence in favour of iron, places brick-work and concrete on an equal footing—a result certainly most favourable to those who advocate the use of the latter, both on the score of efficiency and economy.

J. S. W.

ROTHERHAM HOSPITAL AND INFIRMARY.

NINETY-TWO designs were sent in, and the votes were 17 to 3 in favour of the design bearing the motto "Æsculapius," by Messrs. Mallinson & Bakewell, architects, Leeds and Dewsbury, which was therefore selected. According to our correspondent,—

"The plan is so arranged that each department is separate and complete in itself, and yet at the same time in contiguity with the various offices and departments, each having a distinct entrance.

The hospital entrance on the west side, with the porter's room, leads immediately to the waiting-room, bath-room, for cleansing, and examination of patients before admission to the wards, to the operating theatre and accident ward for patients that may have to be operated on, upon their immediate entrance.

The dispensary entrance is on the north side of the administrative department, with its lobby. The large hall for the patients to wait communicates immediately with the physicians' room, and with the surgeons' rooms, for the economy of time, the dispensary adjoining for prescriptions, medicine, &c., with hatchway or window into the hall, and one is also provided for the lobby."

SMOKY CHIMNEYS.

SIR,—Can any of your correspondents advise us what to do under the following circumstances:—About two years ago we built a village school-room 40 ft. by 20 ft. It has a high-pitched roof; the chimney is on the north side, and is carried up higher than the roof, but in spite of all we can do it will not draw when the wind is in the north or east. We have tried chimney pots and cowls of various kinds; we have also closed up the open fire, and replaced it by a Gill stove: still the wind rushes down, carrying the smoke and flame into the room; we have also tried various kinds of openings in the chimney, but without any advantage. There is no doubt the chimney is too large, being 14 in. or 15 in. square, and being on the north side, the fire has not power to warm it. We had some thoughts of trying to introduce an iron pipe to form an inner flue, as this could be more easily warmed if the fire could get to it; but of this there appears no chance: as the down draught is so strong, the fire cannot reverse it. We have already spent many pounds about it, and any practical advice would be most thankfully received.

ONE OF THE COMMITTEE.

COMPETITIONS.

THE design of Mr. Thomas Oliver, of Newcastle-upon-Tyne, has been selected for the proposed New Congregational Church, Toxteth Park, Liverpool.

Bognor Sea Defences.—The Bognor Local Board, Sussex, recently advertised in this paper for designs for sea defences, offering a premium of 50*l.* for design selected. Forty-two designs were submitted to the Board, principally by engineers. The Board obtained the assistance of Mr. J. W. Grover, C.E., of Victoria-chambers, Westminster, to examine the designs, and report thereon. Mr. Grover reported that the best design, taken as a whole, was that bearing the motto "Canute defying the Waves," submitted by Mr. Green, of Lewes and Hertford (to whom the premium has been awarded). Mr. Grover also reported that the design "Experience," by Mr. F. A. Klein, of Cannon-street, London, was a good proposal, and deserved the consideration and commendation of the Board; as also the designs "*Nil sine Labore*," "*Vis Consilii expers mole ruit sua*," and "Zero," submitted respectively by Mr. T. L. Evans, of Gosport; Mr. Palmer Smythe, of Belsize Park, London; and Mr. W. G. Bennett, of South Villa, Hampstead.

House Architecture in Carlisle.—The premium of 20*l.* offered by the corporation of Carlisle for designs of elevations of houses proposed to be erected in Alfred-street and South Portland-square, in this city, has attracted sixteen sets of plans, which are now being exhibited to the public in the town-hall. Many of them are of a very unsuitable kind and have evidently been the work of 'prentice hands; but there are a few designs evincing both architectural skill and practical knowledge of building. A set, for example, bearing the motto, "Design with beauty, build with truth," seems to attract favour. Two or three others might be named. The committee have not yet arrived at a final decision.

KIDDERMINSTER INFIRMARY COMPETITION.

SIR,—As the author of another of the rejected designs, I was waiting but a few minutes' leisure to send you my murmurs upon this despicable job. I am glad to see in your number of last week that the subject has been taken up by a brother competitor. During a long practice, though happily very little experienced in competitions, except in noting in the pages of the *Builder* the many enormities to which they give rise, nothing more iniquitous than the management of this one has ever come under my observation.

In the interests of my fellow sufferers and myself, I will, with your kind permission, challenge the committee to answer the following straightforward questions:—

1. Did Mr. Bland, the author of the accepted design, deliver his drawings a day later than the date named in the conditions, viz., on the 10th of February instead of the 9th?

2. Had not Mr. Bland access to the room in which the designs were exhibited during the time certain members of the committee were inspecting and discussing such designs?

3. Did not the estimate for carrying out Mr. Bland's design amount to more than 5,000*l.* instead of 4,000*l.* (the limit fixed by the conditions)?

4. Is not Mr. Bland the personal friend and architect of the honorary secretary to the committee?

REJECTED.

ACTION FOR COLOURS SUPPLIED.

ON Tuesday judgment was given at the Bloomsbury County Court, by Mr. G. Lake Russell, judge, in the case of J. Detenre *v.* Graham. Plaintiff, who resides at 29, Paradise-terrace, Islington, called, with his daughter, in July last, upon Messrs. Jackson & Graham, and submitted small samples of various colours to the firm; they were referred to Mr. Pugh, the surveyor to the firm, and he selected about thirty colours, and directed the plaintiff to send samples of each colour for the purpose of being tested as to quality, at the same time informing the plaintiff that the colours must be of the best possible quality, as none other were used by the firm. Plaintiff denied that anything was said about quality, and he said the goods were ordered for use and not as samples to be tested. He sent in thirty small boxes of colours, and received a bill payable at three months, signed by Mr. Pugh for the goods, but when it became due, Messrs. Jackson & Graham repudiated it.

Mr. Codd, barrister, who appeared for the defence, contended that the action was a deliberate attempt to defraud Messrs. Jackson & Graham, and he called Mr. Edgar Graham and Mr. Pugh, who positively swore that the colours were to be sent in as samples on approval; that they were tested, and were found to be worthless for the use of the firm, and they were returned. Plaintiff was informed that all colours must be of the best quality, and as regarded the bill for payment at three months, Mr. Pugh signed it, believing it to be the usual delivery paper accompanying the articles. He had no authority to give promissory notes, and, in fact, the firm never paid in that way.

Mr. Clark, foreman of painters to Messrs. Jackson & Graham, stated that he examined the colours in question, and they were perfectly worthless to the firm.

Mr. Jarvis cross-examined the witnesses for the plaintiff, to show that the colours were supplied at a low price, and that it could not be supposed that colours of the best quality were to be supplied, but the witnesses stated that the colours were bad at any price, and

The judge, in delivering judgment for the defendants, said he fully believed that the order was given for samples only, and that the goods were left upon approval. It might be said that they were left for a considerable period before they were returned, but it must be borne in mind that a few days after a letter was written from Messrs. Jackson & Graham, to the plaintiff, stating the colours had been tested, and were of no use to the firm. As regarded the promissory note, no doubt Mr. Pugh had exhibited a want of caution in the matter in signing it, believing it to be a notice of delivery. Under all the circumstances, he must give judgment for the defendants, with costs.

Books Received.

The Royal Academy; the "Outsiders;" and the Press. By T. J. GULLICH. London: Hardwicke. 1869.

THAT the body of English artists outside the Academy have been grievously disappointed and damaged in this the first year of the opening of the new galleries at Burlington House appears certain. The fact that, while led by the prevalent belief that there would be a great increase of space available, 1,600 pictures were sent in more than in any previous year, there is very little increase in the number of paintings exhibited—that 4,500 works of art were sent in; and that the number catalogued is 1,320—will almost suffice to prove this. The writer of the pamphlet before us, Mr. Gullich, known as an art-critic, goes farther, however, than this, and gives his reasons for asserting that in consequence of an extra number received of works by Academicians, associates, and foreigners, there are a hundred paintings less by native outsiders in this year's exhibition than there were in the last. He makes various charges against the hanging committee, with a tone of acerbity that may be thought not unnatural under the circumstances, but which we do not think it necessary to adopt; and he advocates that every artist of merit or promise should have a chance with the public; that the council of selection should include a certain number of connoisseurs and art critics from without; that more time should be devoted to the examination of the works submitted than is now given; that members of the Academy should be limited to a less number of works; and that these should be hung distinct from those by outsiders; ending with an urgent invitation to all whose pictures were returned by the Academy to submit them to the consideration of the committee that has been appointed to arrange the supplementary exhibition.

VARIORUM.

The Popular Science Review for April contains various papers of interest, besides its excellent scientific summaries and reviews. There is a useful paper on spectacles for defective sight; a curious one on the cuttle-fish; another on "The British Lion," of geological celebrity; and various others.——Palestine Exploration Fund: Quarterly statement, No. 1, January 1 to March 31, 1869. Office, 9, Pall-mall East. This statement subscribers get free, and further copies at half-price, or 6d. each. It contains various information as to the progress of the explorations, such as letters and papers, lectures, extracts, &c., and forms an interesting pamphlet. There are also illustrative diagrams.

Miscellanea.

An "Eligible Building Site."—The East London and Cambridge Heath Cemetery, closed by Government simply because it could hold no more, coffins in its latter days having to be placed above and not under the ground, has been taken, says the *Eastern Post*, by some very spirited builder for building purposes. Cheap houses, with neat gardens in front and rear, are to occupy the place of the abodes of the dead, who are to be left to slumber on fully 50 in. deep beneath the kitchen floors! The tombstones, adds our authority, have been carted off by the score to a stoneyard, and duly cut up into mantel-shelves, door-steps, and lintels for the new houses! Can all this be possible? We would fain hope there is some mistake. If not, however, the "spirited builder" ought to be put in limbo in the meantime for stealing the tombstones, if he cannot be prosecuted for desecration of the dead. We are not surprised to hear that very energetic reclamations have been made by those more immediately interested, and that legal proceedings are threatened.

Automatic Water-Engine.—A discovery connected with the raising of water is claimed to have been made by Dr. Bouron, a physician of some reputation, at Haberville, Seine Inférieure. By a very simple piece of mechanism he says he can raise a continuous stream of water to almost any altitude, without labour of any kind, and without expense, beyond that necessary for the first cost of the machine, and this is by no means large. Dr. Bouron states that the power of the machine is based upon a natural and immutable mechanical principle, and that by it there may be created a continuous current of water at the surface of the soil, wherever a spring of water exists, no matter at what depth. The machine is intended to supersede all existing pumps. Dr. Bouron also states that, however paradoxical it may appear, he has found "the greater the height to which the water has to be raised the greater is the power of the machine." As he has not yet protected his discovery, the mechanical details are not at present given, and perhaps this is all one may ever hear of it.

Bursting of the Warwick and Napton Canal Embankment.—A portion of the embankment of the Warwick and Napton Canal, near Warwick, has given way. The water rushed through the aperture into the fields and gardens adjacent to the Avon, and about midway beween the Emscote-bridge and the aqueduct. A large proportion of the embankment on the Warwick side of the river, between 20 ft. and 30 ft. in width, was wholly washed away, and the water submerged two or three adjoining fields, and did serious mischief to the crops and property in that locality. A large open boat was carried through the opening into the fields below, and broken into two parts. The cause of the accident is alleged to lie in the construction of a 3 ft. culvert, the excavations for which beneath the bed of the river were in course of progress at the place where the embankment burst. The culvert is being executed for the Local Board of Health, under a contract.

Paper as a Material for Clothing.—The Japanese paper handkerchiefs are assuredly coming, if the *Globe* be right. The paper collar manufacture has now been extended to less prominent but more important garments, of great strength and flexibility, which can be sewn with a machine, giving seams almost as strong as a woven fabric! The inventor has particularly applied it to the production of petticoats, which are either printed in imitation of the fashionable skirts of the day, or stamped out with open work of such beauty and delicacy as no amount of labour with scissors and needle could imitate. The marvel is that these really beautiful productions can be sold retail at 6d. each! Imitation cretonnes and chintzes for bed furniture are also made, a set costing retail about 5s. The felted material "is so flexible that a curtain may be twisted into a rope and shaken out again, showing as little creasing as a chintz similarly treated." There are also table-cloths embossed with designs of great beauty. This felted paper may in the end have a serious influence on the production of the woven fabrics it is intended to displace. Imitation leather impermeable to water is likewise made of it, and produces a cheap and useful covering for furniture, and even serves for shoes.

The Working Men's International Exhibition.—A public meeting of the inhabitants of Birmingham was held in the Town Hall on Saturday evening, for the purpose of promoting the Working Men's International Exhibition, to be held in the Agricultural Hall, London, next year. Lord Lyttelton presided, and in opening the proceedings expressed his warm interest in the undertaking, and his hope that it would be successfully carried out.

Technical Education.—On the 30th ult. fifteen members of the science class, held during the past winter in Bedford, were examined by means of printed questions, superintended by three gentlemen, members of the local committee. This class commenced in November last at the local Working Men's Institute. Twenty-one joined in all, three discontinued for various reasons, and three were absent on the examination night. The subject of study in the class was physiology, illustrated by life-size diagrams. The answers given were sealed up, and sent to the Science and Art Department, South Kensington. It is expected that the list of successful candidates will be issued in about two months. The examiner is Professor Huxley.

The New Bridge at Blackfriars.—At a recent Court of Common Council, the Lord Mayor presiding, a report was brought up from the Bridge House Committee, stating that although a considerable amount of work remained to be done, the new Blackfriars Bridge would be in a sufficiently advanced state to admit of its being opened in the latter part of July. The committee were of opinion that some public ceremony should take place on the occasion, and requested authority to make the necessary arrangements. The report was adopted. Nevertheless, it seems the bridge will not be opened at that date.

The Products of a Gas-Light.—In a report on the Edinburgh Observatory, it is stated by Professor Piazzi Smyth, that in trying some mechanical means of ventilation for carrying off from the top of a room the effluvia of gaslights, there were obtained five pounds of water so acid as at once to redden litmus paper, by the constant burning of one gas-light for a week; a result completely explaining, it is considered, the circumstance of the corroding and falling-off of the covers of books in the Observatory, the Athenæum Club, and elsewhere.

Street Tramways.—At a meeting of the Inventors' Institute, Mr. T. Measom read a paper on the proposed street tramways. After describing various forms of trams and mode of laying them so as to avoid interference with existing traffic, Mr. Measom reviewed at length the advantages or disadvantages that might be expected to result from the adoption of the system in the metropolis. In the discussion that followed, an American gentleman, Mr. G. W. Reid, described the working of the tramways in New York and Boston, which he mentioned were eminently successful even in the latter city, where the streets are narrow and crowded.

The Historical Manuscripts Commission.—A circular has been issued from the Rolls House, Chancery-lane, calling attention to and explaining the object of the new act, and requesting co-operation in carrying it into effect. The circular states that no title-deeds or other private documents are to be read, and no papers of any kind with which the Public Record Office may be entrusted are to be given access to by any one without the express sanction of the owner, who may have them returned at any time, or may allow them to remain as long as he chooses among the public records.

London Artisans' Club and Institute Newman-street.—A social meeting is to be held here on Thursday, May 27th, when Mr. J. G. Crace has kindly engaged to read a paper on "Art applied to Manufactures;" and the Earl of Lichfield, the Right Hon. A. H. Layard, M.P., Sir Harcourt Johnstone, bart., M.P., Mr. Thomas Hughes, M.P., Mr. Frederick Harrison, and other friends of the working classes have accepted invitations to attend. Endeavours are being made to raise funds to obtain a library and philosophical instruments for the club. About 1,000 members have joined.

Glasgow Cathedral Windows. — Some alarm has been created in Glasgow by the assertion of more than one examiner, that the Munich glass is decaying in certain parts. A correspondent has sent us a list of nine windows, wherein the enamel colour, as he asserts, is peeling off in spots or flakes. We know no reason why this should take place, and mention the statement merely to elicit the truth.

Institute of British Architects.—The motion made at the annual general meeting, on the 3rd of May, "That a committee be appointed to inquire into the operations of the Institute, and to propose means for increasing their efficiency," will be considered at a special meeting of the members on Monday, May 31st.

The Roman Pavement near the Mansion House.—With the aid of the contractors, Messrs. Mowlem, Freeman, & Burt, the Library Committee of the Corporation of London have been able to arrange so that any person wishing to see this interesting relic *in situ* can do so this Friday (the 21st) and Saturday (the 22nd). The entrance is in Bucklersbury.

A New Electric Organ.—In St. George's Church, Tufnell Park, a new organ has been opened. The quality of tone of many of the stops in this instrument is said to be fine, and advantages are gained from the application of the electric system.

Another Bridge across the Mersey.—Messrs. William Low and George Thomas, civil engineers, have submitted to the Mersey Dock and Harbour Board a letter and plans, illustrating their scheme of crossing the Mersey by means of a railway suspension-bridge between Liverpool and Birkenhead. It will consist of three spans, the centre one 1,800 ft. in length, and the others 960 ft. each, and will be 140 ft. above high-water mark. The bridge would unite the various railway lines in Lancashire and Cheshire. It will be under two miles long, and the total cost is estimated at 1,750,000*l*. This would be the sort of thing to try our engineering mettle before we venture to bridge the Irish and the British Channels.

British Archæological Society of Rome. This society has wound up its proceedings for the season. The weekly lectures and excursions were continued as long as there were any English or American people remaining in Rome to attend them. Mr. Parker concluded with an account of the most recent excavations up to the present time, and announced that they *would not be continued* during the summer from want of funds. The latest discovery is the Remains of the Thermæ of Severus and Commodus, on the opposite side of the Via Appia to those of Antoninus (Caracalla). The "Lecture on the Ancient Streets of Rome and the Roads in the immediate neighbourhood" has been printed for the use of members, with an engraving to show the nature of the foss-ways or hollow-ways.

Ancient Remains in Jersey.—In a field near St. Helier's a tomb constructed of sixteen or eighteen huge stones roofed by three others, and closed at each end, the floor consisting of detritus and sand, has been discovered. There were eleven urns inside, some of them broken and imperfect, but others intact. They approach each other in size, and, standing from 6 in. to 8 in. high, are 9 in. or 10 in. in extreme width. Outside they are symmetrically shaped, and inside they are filled with earth.

City of London Museum.—The Chairman of the City Library Committee writes:—The Museum of the City of London is attached to the library at Guildhall, and consists of a very interesting collection of Roman antiquities, including several rare specimens of *tabellæ, stili, crepidæ, fibulæ, strigiles*, lamps, knives, and many articles of personal adornment in bronze and bone; the glass includes lachrymatories and parts of vessels of various descriptions, shapes, and colours. The Samian ware is particularly fine, consisting of bowls, vases, &c., highly ornamented with emblems of war and the chase. It also possesses many varieties of tesselated pavements, and other building materials of the same date. Among the more important monuments may be mentioned the group described by Roach Smith, of the *Deæ Matres*, found in Crutched Friars; and, of still higher value, a Roman hexagonal column, found at Ludgate, erected by Aeneucletus Provincialis and his wife Martina; also a very beautifully-sculptured-fluted marble sarcophagus, of the fourth century, recently dug up at Clapton. The Mediæval department is far from despicable, and includes the finest collection known of the leaden *signacula* or pilgrims' signs.

Over-papered Walls.—Our readers will recollect mention of a disgusting smell which drove so many officers from their quarters in Knightsbridge Barracks, and threatened the whole establishment with fever. Great pains had been taken by the engineers to remedy the evil. Drains were examined, and floors were taken up, but nothing was found. Since then ventilators have been inserted in every room, and the space beneath the floors has also been ventilated. The *Lancet* now mentions that the cause has been discovered. It was found that there were in one case, at least, fourteen layers of paper, some of them of a most expensive kind. Between these layers of paper stinking paste, fungi, and even maggots had accumulated; whilst, the wall being hollow, the stench spread through the passages behind, and seriously increased the evil. "It is somewhat curious, that although the true cause was suggested by an officer of engineers some months ago, no real attempt seems to have been made to verify his suggestion until the arrival of the present regiment." Warnings against the injurious effects resulting from the practice of leaving successive coats of paper on the walls, will be found in the *Builder*, and on more than one page.

Monumental.—The statue of Mr. Mayer, of Liverpool, which the Corporation intend to place in St. George's Hall, as a memorial of Mr. Mayer's munificent donation, to the local museum, of antiquities, which cost over 50,000*l*. and half his lifetime in the collection, is now completed at Chelsea, by Signor Fontana, the sculptor named by Mr. Mayer, at the Corporation's request, to execute the statue. The figure is a portrait of Mr. Mayer as he appears in ordinary daily life. The proportions are of heroic dimensions, and the material is Carrara marble, of remarkable purity. It is said to be a good likeness.——The pedestal of the statue of the Marquis of Westminster at Chester is now complete, and has just received the statue, which has been forwarded from Mr. Thorneycroft's studio. The plinth, or base, consists of four blocks, and is, like the rest of the pedestal and capping, of a polished grey granite. The local *Chronicle* says of the inscription, which is in gilt letters, "The only objection to which this is open is the abbreviation of 'second Marquis.' We cannot understand why '2nd' should not have been used, which would have been far preferable to 2d, as the latter is liable to a funny ambiguity which will at once suggest itself."——An immense crowd assembled at Sydney, on the 28th March, to witness the laying of the foundation-stone of the statue in memory of Captain Cook, by his Royal Highness the Duke of Edinburgh.

Westmoreland Granite.—A new branch of industry has recently been established on Shap Fells. Some time ago Mr. Curteis, a gentleman connected with the Dalbeattie Quarry Works and now residing at Penrith, directed his attention to a huge granite formation on a fell known as Wastdale Crag, about four miles from Shap railway-station and about two miles from Shap Wells. He obtained a lease of the property from the Earl of Lonsdale, and in the middle of July last began operations, and, in spite of many difficulties, by the aid of costly machinery has now made considerable progress. Wastdale Crag is the only granite ridge between Scotland and London, with the exception of minor deposits in Leicestershire, so that the cost of transmission from all parts of England and Wales will, it is expected, enable the lessees to compete successfully with the Scottish quarries in this respect. From its extent, too, the supply will be comparatively inexhaustible. The yield is 90 per cent. upon the blastings, whereas in many quarries in Scotland it is said to be not more than 50 per cent. The blocks are of immense size. One block was computed at 2,700 tons of pure granite, and blocks of from 20 to 100 tons in the solid are frequently blasted. The granite has three shades; one a light grey, another a dark red, and an intermediate colour, variegated and ornamental. It is harder than the Dalbeattie granite. Lately 1,000 ft. of curb were finished and sent to London, the lessees having contracted with one of the metropolitan districts, and they have contracts for work in connexion with the New Town-hall at Manchester, and the Midland Railway hotel, in the New-road, London.

The Brighton Drainage.—The residents in Brighton are naturally anxious as to the result of draining it into the sea in front of the town, and unfavourable to the scheme. They have, therefore, had a public meeting, and have resolved:—

> "That in the state of public opinion in reference to the system of drainage in Brighton, and in view of the injury caused by the existing prejudice against it, the town council be requested to confer with the neighbouring authorities and to receive a deputation from this meeting, with a view to instituting further inquiry into the practicability and expediency of removing the drainage away from the town."

That the Londoners and others who visit Brighton as a watering-place will acquire a prejudice against it on account of the fact that its drainage is disembogued in front of the town, and whether there be sufficient reason or not, as regards the relative purity of the water, seems to be but too probable. The case, as the chairman of the meeting, Dr. Carter, put it, resembles that of an aristocrat dining in a hotel at a table on which was a cloth which had been in use before. The cloth might be as wholesome as ever; but still the aristocratic visitor would not come again. It was something the same with the water in front of Brighton. Visitors would not believe it was fit to bathe in so long as the sewage was drained into it. Moreover, we would earnestly urge the adoption at once of more complete measures to secure an effective and unobjectionable system of drainage for the town.

Mr. Peter Cunningham.—We mention with extreme regret the death of Mr. Peter Cunningham, the author of the "Handbook of London," and other works, which took place on the 18th instant at St. Alban's. He had just completed his 53rd year, having been born on the 16th of April, 1816.

Newcastle-on-Tyne: New Slaughter-houses.—New slaughter-houses have been commenced in this town, on the principle of the abattoirs of France. Mr. Thomas Oliver is the architect.——The contracts for erecting a large drill-shed have been let to Mr. Kennedy, of Jarrow. The building will be 130 ft. by 50 ft., and rooms for dressing, smoking, &c. are attached.

TENDERS.

For Congregational Chapel and School, Godalming. Mr. W. F. Poulton, architect:—

Loe	£3,318 0 0
Aldred & Doulton	3,200 0 0
Hallett	3,030 0 0
Moon	2,595 0 0
Carter & Sons (accepted)	2,450 0 0

For alterations to Trinity Chapel, Reading. Mr. W. F. Poulton, architect:—

Wheeler Brothers	£360 0 0
Sheppard	355 0 0
Mathews	354 0 0
Barnicoat (accepted)	348 0 0

For alterations, &c., at No. 126, Newington-causeway, for Mr. J. F. Smith:—

Cumming & Mullins	£322 10 0
Falkner	321 0 0
Goodes & Clarke (accepted)	307 16 8

For new Wesleyan Chapel and School, Church Coppenhall, Cheshire. Mr. George B. Ford, architect:—

Cotterill	£812 0 0
Hodgkinson	811 0 0
Ellison	738 10 0
Williamson (accepted)	670 4 4½

For alterations to premises, South Audley-street, for Messrs. Wilson Brothers. Mr. J. W. Morris, architect:—

Sheffield	£382 0 0
Wicks & Bangs	352 0 0
Stevens	343 0 0
Abrahams (accepted)	338 0 0

For a house and farm buildings at the homestead known as Lower Cromer Hyde Farm, Lemsford Mills, Herts, for Viscountess Palmerston. Mr. W. Wilds, architect. Quantities supplied:—

Castle	£1,697 0 0
Bint & Son	1,680 0 0
Raves & Blow	1,566 0 0
Lawrence	1,444 0 0
Wells	1,425 0 0
Ekins	1,286 0 0

For the restoration of Kimcote Church, Leicestershire. Mr. William Smith, architect:—

Law (accepted)	£1,065 0 0

For the re-building Boyton Church, Suffolk. Mr. William Smith, architect:—

Tooley	£1,510 0 0
Last	1,486 10 0
Cullingford	1,482 10 0
Hewitt	1,432 0 0
Carter	1,252 0 0
Cunnold	996 0 0

For the erection of a residence, St. Godwald's, Finstall, near Bromsgrove, for the Rev. J. H. Bainbrigge. Messrs. Payne & Talbot, architects:—

Wilson & Son	£1,760 0 0
Surman	1,667 0 0
Partridge	1,600 0 0
Jeffery & Pritchard	1,550 0 0
Matthews (accepted)	1,505 19 0

For additions to a private residence, Blackheath. Mr. J. H. Rowley, architect:—

Brass	£559 0 0
Homann	480 0 0
Snowden	478 0 0
Sharpington & Cole	379 0 0
Shepherd	365 0 0
Crabb & Vaughan	364 0 0
Beeton (accepted)	325 0 0

For the erection of two pairs of semi-detached residences at Red Hill, for Mr. Joseph Perren. Messrs. Holden & Tribe, architects. Quantities supplied:—

Holdsworth	£2,638 14 0
Marsland & Sons	2,490 0 0
Putland & Holt	2,457 12 8
Gage	2,410 10 0
Regis, sen.	2,310 0 0
Room	2,283 0 0
Cook	2,255 16 0
Hooper	2,160 0 0
Grummant (accepted)	1,720 0 0

For taking down and rebuilding the parish church of Bishampton, Worcestershire. Mr. Frederick Preedy, architect:—

Wood & Sons	£1,877 0 0
Bennett	1,784 0 0
Warner	1,698 5 0
Inwood	1,694 0 0
Hearn	1,601 0 0
Collins & Cullis	1,541 0 0
Griffiths (accepted)	1,509 10 0

For St. Mark's Schools, Notting Hill. Mr. Currey, architect. Quantities supplied by Mr. J. H. Strudwick:—

Foster	£2,350	0	0
Colley	2,270	0	0
Cowland	2,170	0	0
Higgs	2,083	0	0
Butt	2,050	0	0
Perry & Co.	2,040	0	0
Downs	1,987	0	0

For alterations, repairs, and painting of Christ Church, Tunbridge Wells. Mr. William Bond, architect:—

Edwards & Walkling (accepted)	£248	2	0

For a villa residence, with a conservatory and stabling, at Langton, near Tunbridge Wells, for Messrs. Henry & Robert Goodsham. Mr. William Bond, architect. Quantities by Mr. Albert Vicars:—

Winnifrith	£2,247	0	0
Edwards & Walkling	2,233	16	7½
Strange	2,190	12	0
Willicombe, Son, & Oakley (accepted)	2,130	0	0
Mercer	2,125	11	8

For the erection of new National Schools for the parish of St. Silas, Islington, for the Rev. J. Wilkinson, M.A. Mr. Edwin Clare, architect. Quantities supplied by Mr. Waymouth. After deducting allowances respectively made for old materials on the site, but including prices given for boundary walls:—

Herring	£2,807	0	0
Foster	2,198	0	0
Williams & Son	2,126	0	0
Fairhall & Weekes	2,079	0	0
Webb	2,077	0	0
Dove Brothers	2,025	0	0

For re-building premises, Nos. 199, 200, & 201, High Holborn, for Mr. G. Kent. Mr. W. J. Trehearne, architect. Quantities supplied:—

Thompson	£11,460	0	0
Patman & Fotheringham	11,285	0	0
Macey	10,297	0	0
Scrivener & White	9,968	0	0
Sawyer	9,795	0	0
Colls & Son	9,725	0	0
Hill, Keddell, & Waldram (accepted)	9,635	0	0

For construction of sewers, subways, vaultage, and incidental works in a new street from northern side of Holborn Valley to Farringdon-street, for Corporation of the City of London. Mr. W. Haywood, engineer. Quantities supplied by Mr. Stent:—

Hill, Keddell, & Waldram (accepted)	£24,729	0	0

For Wesleyan Chapel at Barking. Messrs. Pocock, Corfe, & Parker, architects. Quantities supplied:—

Hill, Keddell, & Waldram (accepted)	£2,420	0	0

TO CORRESPONDENTS.

P. & T.—W, W.—B. & M. W.—J. N. C.—J. H. R.—E. J. P.—Competitor.—Kidderminster Pump.—E. G.—J. W.—E. V.—Chev. da S.—J. F.—Young T. P.—R. B.—J. B. D.—H. & T.—Messrs. O'C.—Bognor.—I. M. M.—F. P.—F. D. W.—W. B.—A. V.—J. S. R.—G. B. F.—T. R.—W. R.—W. H. B.—A. U. P.—G. & C.—C. C. H.—Mrs. B.—F. Iron-works.—T. W.—B. S.—E. A.—W. F. P.—Jack Plane.—B. G.—R. L. S.—W. S.—H. K. & W.—R. I. R. (always glad to receive information).—C. H. (shall appear).—W. C. (shall appear. Send particulars at convenience).

We are compelled to decline pointing out books and giving addresses.

All statements of facts, lists of Tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

IMPROVED MACHINERY, combined with STEAM POWER, is employed by J. W. BENSON in the Manufacture of Church, Turret, Stable, and Tell-tale Clocks, Sun and Wind Dials, Perpetual Calendars, and every description of Clock and Watch Work. Architects, Builders, Committees, &c. can be promptly supplied with estimates. A descriptive Pamphlet on Church and other Clocks, post-free, 2d. J. W. BENSON, by special appointment, Watch and Clock Maker to His Royal Highness the Prince of Wales. Steam Factory for Clocks and Watches, 58 and 60, Ludgate-hill; Showrooms, 25, Old Bond-street, London.

Just published, price Sixpence,
MILITARY WORK by MILITARY LABOUR.
By an OFFICER of ROYAL ENGINEERS.
London: CORNELIUS BUCK, 24, Paternoster-row, E.C.; WILLIAM MITCHELL, 39, Charing-cross, S.W.

PERFECTION in BOOKKEEPING.—BUILDERS and Others desiring a really good system, can have a SET of MODELS for BUILDERS' BOOKS, by DOUBLE ENTRY, to which was awarded the prize offered in "The Builder," No. 1,180, and which has been adopted by many large firms. Also a Modified Arrangement by Single Entry, suitable for small builders.—Address, E. A. 4, St. George's-road, Regent's Park, London.

Just published, in crown 8vo. price 3s. 6d. cloth,
PAINTED WINDOWS: a LECTURE
By the Rev. FREDERICK BURN HARVEY, M.A.
On the New West Window lately presented to Great Berkhamsted Church.
London: LONGMANS, GREEN, & CO. Paternoster-row.

Just published, in imperial oblong folio, Price One Guinea.
THE PRINCIPLES of PERSPECTIVE.
Illustrated in a Series of Examples.
By HENRY D. HUMPHRIS.
London: CHAPMAN & HALL, Piccadilly.
Cheltenham: HENRY DAVIES; and all Booksellers.

CRANSTON'S PATENT GLASS BUILDING for HORTICULTURE Plans and Estimates free.
Just published, free for 30 stamps, 3rd Edition.
DESCRIPTIVE BOOK, splendidly illustrated from existing Buildings.
By the Author and Patentee, JAMES CRANSTON, Architect, 1, Temple-row West, Birmingham.
H. J. GROWTAGE, Manager.

PROFESSOR PEPPER'S NEW ILLUSTRATED WORK.
In large crown 8vo. price 9s. cloth gilt, and gilt edges, 720 pages.
CYCLOPÆDIC SCIENCE SIMPLIFIED.
By J. H. PEPPER, Professor of Chemistry, and Honorary Director of the Royal Polytechnic Institution. Embracing LIGHT—HEAT—ELECTRICITY—MAGNETISM—PNEUMATICS—ACOUSTICS—CHEMISTRY.
With Six Hundred Illustrations.
F. WARNE & CO. Bedford-street, Covent Garden.

NOW ON VIEW, 59, St. George's-road, Southwark.—To Cabinet-makers, ulders, Timber Merchants, Building Material and Firewood Dealers, and Others.

MR. JAMES BOX will SELL by AUCTION, on the PREMISES, as above (without reserve), by order of the Executors of the late Mr. John Lockar, on MONDAY, MAY 24, 1869, at TWELVE for ONE o'clock precisely, the third and remaining portion of the extensive and well-seasoned STOCK of TIMBER: comprising Spanish and Honduras mahogany slabs and boards, a quantity of fine dry cut deals, 8 capital logs of rosewood, large quantity of cedar in ¼ and ½ inch and bead, various lots of veneers, 450 best pine planks, about 100 fathoms of wood, including mahogany, wainscot, firewood, &c.; together with the Implements in Trade, consisting of trucks, pit-saws, hoist, ropes and pulleys, jacks, crowbars, lathe, rollers, veneer bin, immense pile of stacking sticks, office desk, table, s oves, step-ladders, partitions, doors, and innumerable useful items. May be viewed on Friday and Saturday preceding the day of the sale.—Catalogues may be had on the Premises, and of the Auctioneer, 19, Wilson-street, Finsbury-square, E.C.

N.B.—The valuable Estates will be sold at the Auction Mart, Token-house-yard, early in June, of which due notice will be given.

UPPER PLAISTOW.
MR. EDMUND LITTLER will SELL by AUCTION, at the EARL DERBY, London-road, Plaistow, on MONDAY, MAY, 24th, at FIVE for SIX o'clock, Twelve Semi-detached LEASEHOLD VILLAS and Eight CARCASSES; also several Plots of very eligible Freehold Building Land, in most commanding situations, close to the Plaistow Station, Southend Railway, now directly connected with the North London Railway. Nine-tenths of the purchase-money for freehold lots can remain on mortgage at 5 per cent. and four-fifths for leasehold lots at 6 per cent. to be paid by equal half yearly instalments.—Particulars and plans may be obtained at the principal Inns; of Messrs. GELLATLY, SON, & WARTON, 3, Lombard-court, Gracechurch-street; and at the Auctioneer's Offices, Plaistow.

KILBURN.—Eligible Leasehold Investment.
MESSRS. DANIEL SMITH, SON, & OAKLEY have received instructions to offer for SALE by AUCTION, at the MART, Tokenhouse-yard, on TUESDAY, MAY 25th, at TWO o'clock precisely, in seven lots, SEVEN LEASEHOLD HOUSES with gardens in the rear, being Nos. 17, 19, 21, 23, 27, and 29, Oxford-road, and No. 48, Cambridge-road, each containing six bed-rooms, two dressing-rooms, drawing-room, dining-room, ante-room, kitchen, scullery, &c. and four cellars in the area. The houses are semi-detached, built of brick and partly stuccoed, and being let to good tenants afford a sound investment. The Property is held on lease, of which about 90 years are unexpired, at a ground-rent of 11l. each house, and produces a rental of 370l. per annum.—Further particulars may be obtained on application to Messrs. HOLLINGSWORTH, TYERMAN, & GREEN, Solicitors, 4, East India-avenue, Leadenhall-street, E.C.; at the Auction Mart; or to Messrs. DANIEL SMITH, SON, & OAKLEY, Land Agents and Surveyors, 10, Waterloo-place, Pall Mall, S.W.

SURREY.—In the delightful vicinity of East Sheen, about half a mile from Mortlake Station, whence Waterloo is reached in about 30 minutes, with constant communication with Ludgate-hill, Cannon-street, and Charing-cross Stations.

MESSRS. DANIEL SMITH, SON, & OAKLEY have received instructions to offer for SALE by AUCTION, at the MART, Tokenhouse-yard, E.C. on WEDNESDAY, JUNE 16th, at TWO precisely, in one lot, unless previously disposed of by private contract, the valuable FREEHOLD FAMILY RESIDENCE, known as Percy Lodge, placed in grounds of an ornamental but inexpensive character, with stabling, coach-house, and various out-offices, conservatory, kitchen garden, and paddock, with small set of farm premises in the rear, the whole containing about 3½ acres. The house, which is substantially built of brick, is in an excellent state of repair. There are four principal reception-rooms, which are large and lofty, and 18 principal and secondary bed-chambers and other rooms, with two good staircases and domestic offices, which are spacious and good. The property is situate in a most excellent neighbourhood, within short drives of Richmond, through the Park, and Hampton Court. Possession will be given on completion of the purchase.—Particulars, with plans, may be obtained of Messrs. BENNETT, DAWSON, & BENNETT, Solicitors, No. 2, New-square, Lincoln's-inn, W.C.; of ALBERT CHANCELLOR, Esq. Surveyor, Richmond, Surrey; at the Place of Sale; and of Messrs. DANIEL SMITH, SON, & OAKLEY, Land Agents and Surveyors, 10, Waterloo-place, Pall-mall, London, S.W.

EAST SHEEN, SURREY.—Valuable Freehold Building Land, free from land-tax, containing upwards of nine acres, and a Freehold Ground-rent secured upon a capital family residence, with reversion to the rack rent.

MESSRS. DANIEL SMITH, SON, & OAKLEY have received instructions to offer for SALE by AUCTION, at the MART, Tokenhouse-yard, E.C. on WEDNESDAY, JUNE 16, at TWO precisely (unless previously disposed of by private contract), valuable FREEHOLD BUILDING LAND, situated near to the entrance to Richmond Park, which, with the surrounding attractive neighbourhood, affords some very pleasant drives, being at the same time within seven miles by road from the City or West-end. The property is arranged in five plots, each varying from 1½ to 2¾ acres in extent, having extensive frontages, and approached by capital roads, adapted to the erection of first-class residences, which are much sought after in this select and fashionable locality. The freehold ground-rent is 45l. per annum, secured upon a capital family residence. The term has ninety-four years unexpired, with reversion to the rack rent, forming an excellent and safe investment for capital.—Particulars and plans may be obtained as in the preceding advertisement.

Sewing Machines, Lifting Jacks, Irish Cars, Cupolas, Steel and Zinc, Harness, Packing Cases and Boxes, Girths, Scrap Iron, Fire Guards, Tools, Lead Ashes, Mixed Metal, Leather, Wagons, Carts, Files, Nails, &c.

MR. SPILLMAN, of Bell-yard, Fleet-street, W.C. will SELL by PUBLIC AUCTION, at the ROYAL ARSENAL, Woolwich, by order of the Secretary of State for War, on MONDAY, JUNE 7, 1869, at ELEVEN o'clock in the forenoon precisely.—The lots may be viewed at the Royal Arsenal, Woolwich, from Ten to One o'clock, and from Two to Five o'clock, on the three working days previous to, and on the morning of, the day of sale; and catalogues may be obtained at the War Office, Pall-mall; at the Tower; and at the Royal Arsenal, Woolwich.

NASCOT ESTATE, WATFORD, HERTS.—Freehold Land, affording most charming sites for the erection of First-class Villa Residences.

MESSRS. HUMBERT & COX have received instructions to offer for SALE by AUCTION, at the ESSEX ARMS HOTEL, Watford, on TUESDAY, the 25th day of MAY, at FIVE o'clock precisely, Eight Pieces of FREEHOLD LAND, varying from 0a. 3r. 0p. to 1a. 3r. 0p. in extent, in Eight Lots. The site is most picturesque, and in a good hunting district; it possesses every advantage, the soil is gravel upon chalk, there is a good market-town in close proximity, and the railway accommodation is all that could be desired. Three-fourths of the purchase-money may remain on mortgage at 5 per cent.—The land may be viewed, and particulars and conditions of sale may be had of Messrs. VALPY & LEDSAM, Solicitors, 60, Carey-place, Lincoln's Inn, W.C.; and of the Auctioneers, 88, St. James's-street, S.W. and Watford, Herts.

To Ironmongers, Builders, Carpenters, Cabinet makers, Gasfitters, and Others.
MR. BILLINGAY will SELL by AUCTION, without reserve, at Messrs. NORMAN & SONS' ROOMS, No. 5, Little Britain, E.C. on TUESDAY, MAY 25th, 1869, at TWELVE for ONE o'clock precisely (instead of the day previously announced), an assortment of CABINET and BUILDERS' IRONMONGERY, including 400 dozen rim, mortise, drawback, pad, chest, and other locks, latches, bolts, hinges, screws, nails, cabinet and builders' brasswork, gaseliers, and other fittings, carpenters' tools, quantity of Turton's steel cart springs, fenders, fireirons, sundry tin, copper, and japanned goods, also a Thomas's powerful sewing-machine, and numerous effects.—May be viewed day previous and on morning of Sale. Catalogues at the Rooms; and of Mr. BILLINGAY, Ironmongers' and Founders' Valuer and Auctioneer, 64, King William-street, London Bridge, E.C.

BALHAM, SURREY.—Eligible Freehold Building Land for Cottage Property.
MR. WHITTINGHAM is instructed to SELL by AUCTION at the AUCTION MART, Tokenhouse yard, City, E.C. on MONDAY, MAY 24, 1869, at TWELVE for ONE o'clock precisely in the Afternoon, in lots, a further portion of the eligible FREEHOLD BUILDING LAND, situate in the new roads leading from Holly-grove, Balham-hill, and suitable for the erection of cottages. The property is situate between the Wandsworth and Balham Stations, about five miles from the City and West-end, and about ten minutes' walk from the Clapham Junction and Balham Stations on the London, Brighton, and South Coast and South Western Railways. Nine-tenths of the purchase-money may remain on mortgage or contract at 5 per cent. to be paid in nine years by equal half-yearly instalments; but the whole or any part of the balance may be paid off at any time without notice.—Particulars, plans, and conditions of sale may be obtained ten days before the sale, at the principal Inns in the neighbourhood; of Messrs. RUSSELL & DAVIES, 59, Coleman-street, E.C.; of the Auctioneer, 14, Moorgate-street, London, E.C.; and at the Place of Sale.

GREAT YARMOUTH.
J. W. De CAUX has received instructions from Mr. S. Seago, to SELL by AUCTION, on TUESDAY, JUNE 1st, 1869, at TWELVE o'clock at noon, upon the PREMISES, near the Suspension Bridge, Great Yarmouth, the following valuable SAW-MILL PLANT, consisting of 8. H. P. table engine (in working order); 8. H. P. horizontal engine; 8. H. P. portable engine (in working order); two boilers, 9 feet by 4 feet, and 12 feet by 3 feet. Deal sawing-frame complete; timber frame, driving shaft, condenser, three pumps, three benches, eighteen saws, &c.—For further particulars, apply to the Auctioneer, Regent-road, Great Yarmouth.

Important Sale, Camden Town.—By order of the Executrix of the late Mr. W. Beaver.—To Timber Merchants, Contractors, Builders, and Others.
MR. LEREW will SELL by AUCTION, on the PREMISES, Camden-yard, Great College-street, on MONDAY, JUNE 7th, and following days, at TWELVE for ONE each day, the old-established TIMBER-YARD and TWO DWELLING-HOUSES, Nos. 2 and 4, Great College-street, the whole occupying an area of about 13,000 superficial feet; unexpired term about 20 years, at the low rent of 50l. per annum; together with the extensive dry STOCK and PLANT, viz.: 5,500 pine yellow and white planks, deals and battens whole, 2,000 ditto cut, 4,000 feet wide pine, 6,000 feet mahogany, 200 squares of flooring, 14,000 feet oak, yellow and white quartering, 5,000 feet sill, 3,000 feet oak planks, 4,500 feet wainscot, 4,500 feet birch, 2,500 feet beech, 3,200 feet ash, 20 loads of Memel timber, 20 loads of yellow balk, 250 poles, 700 puttogs, 3,000 feet mouldings, match boards, slating battens, pantile and other laths, felt, 80 doors 60 sashes and frames, 14 benches, horse, harness, 3 carts, 4 trucks office fittings, and much other useful stock.—May be viewed, catalogues and particulars had on the Premises; of J. EVANS, Esq. Solicitor, 59, Lincoln's Inn Fields; and of the Auctioneer, Cardington-street, Hampstead-road, near Euston Station.

BATTERSEA.—To Builders and Others.
MESSRS. BROAD, PRITCHARD, & WILTSHIRE will SELL by AUCTION, at the new AUCTION MART, Tokenhouse-yard, E.C. on TUESDAY, the 25th day of MAY, at ONE o'clock precisely, in two lots, the valuable and well-built CARCASSES of Thirty-seven HOUSES, situate and being all the brick erections in Home-road, Colestown Estate, Battersea, near the Battersea and York-road Stations. Several are in an advanced state of completion. The estimated rental value of each is, when finished, 35l. per annum. Held under separate leases at low ground-rents.—May be viewed. Particulars and conditions at the Mart; of Messrs. NICKINSON, PRALL, & NICKINSON, Solicitors, 51, Chancery-lane, W.C.; and of the Auctioneers, 38, Poultry, E.C.

EAST GRINSTEAD, SUSSEX.—To Builders and Others requiring extensive Business Premises.
MESSRS. TURNER & RUDGE have been instructed by Mr. Robert Pink, who has succeeded to an old-established business in Surrey, to SELL by AUCTION, at the PUBLIC ROOM, East Grinstead, on FRIDAY, JUNE 11th, 1869, all that highly-important and commanding BUSINESS PREMISES in the occupation of the owner; comprising a well-arranged dwelling-house, with excellent shop, office and store-rooms, workshop, yard, and garden, situated in the London-road, within three minutes' walk of the Railway-station.—Particulars and conditions of sale obtained of Messrs. PEARLESS & SONS, Solicitors, East Grinstead; and of the Auctioneers, East Grinstead.

UPPER NORWOOD.—Freehold Building Estate of 26 acres, with possession. Also 16 small Lots on the Hill, and a Residence, with large garden.
MR. PHILIP D. TUCKETT will SELL by AUCTION, at the MART, Tokenhouse-yard, E.C. on TUESDAY, JUNE 1st, at ONE, in 1 lot, by order of the Mortgagees, the DALE-PARK ESTATE: comprising a cottage and garden and 23 acres of very eligible building-land, having a long frontage to the high road, situate close to the Royal Beulah Spa Hotel, and about one mile from the Gipsy-hill, Crystal Palace, Norwood Junction, and Thornton-heath Railway Stations. This favourite locality is now so nearly surrounded by buildings, that it cannot be doubted that this estate will be speedily covered with great profit to the builders. Also, in sixteen separate lots, sixteen sites on the Hill, for single houses, and a semi-detached residence, called Spa Cottage, with large garden, adjoining the grounds of the Royal Hotel.—Particulars of Messrs. LACE, BANNER, & CO. Solicitors, No. 1, Union-court, Liverpool; Messrs. EDWARDS & CO. 8, Delahay-street, Westminster; or, of Mr. PHILIP D. TUCKETT, Land Agent, Surveyor, &c. 10a, Old Broad-street, E.C.

FOREST-GATE, E.—Freehold Country Residence and Building Land, with early possession.
MR. PHILIP D. TUCKETT will SELL by AUCTION, at the MART, E.C. on TUESDAY, JUNE 1, at ONE, in two lots, the following very desirable and compact FREEHOLD PROPERTIES, viz.—Lot 1. An old-fashioned but commodious detached Residence, with gardens, vineries, coach-house, stabling, &c. in all about three-quarters of an acre, most conveniently situate almost close to Forest-gate Railway Station, whence frequent trains reach Bishopsgate in about seventeen minutes; let to Mr. Daniell, Solicitor, at a rent of 50l. for a term expiring at Christmas next. Lot 2. A Paddock, Orchard, and Garden adjoining Lot 1, and held therewith, but subject to one week's notice, occupying a prominent corner position, having 538 feet of frontage to two good public roads, and comprising 2a. 2r. 20p. of very valuable building land, the whole immediately available for the erection of moderate-sized villas, without any expenditure in new roads.—Particulars, with plans, of Messrs. YOUNG, JONES, ROBERTS, & HALE, Solicitors, 2, Bc. Mildred's-court, E.C.; or, with orders to view, of Mr. PHILIP D. TUCKETT, Land Agent, Surveyor, &c. 10a, Old Broad-street, E.C.

J. NEILL & SON,
QUANTITY SURVEYORS,
11, COOKRIDGE STREET, LEEDS.
Highest testimonials from several eminent architects. Terms on application.

Just published.
QUANTITIES MADE EASY.
A quick and accurate method of taking out quantities from plans or buildings, with or without a specification. Sent free by post for 30 stamps.—Address, A. C. 16, Medway-terrace, Tyrwhitt-road Upper Lewisham-road, New-cross, S.E.

TO COUNTRY ARCHITECTS.

PARTNERSHIP.—The Advertiser is desirous of treating with an Architect in good practice for the PURCHASE of a SHARE in his business.—Address, SOLICITOR, 64, Thornhill-road, London.

TO ARCHITECTS AND SURVEYORS.

PLANS, VIEWS, BILLS of QUANTITIES, Conditions, Specifications, &c. LITHOGRAPHED on the shortest notice, and every description of Stationery required by Architects and Surveyors kept in Stock.—SPOTTISWOODE & CO. 30, Parliament-street, Westminster, and New-street Square, Farringdon-street.

TO ARCHITECTS AND SURVEYORS.

PERSPECTIVES, SKETCHES, ELEVATIONS, &c. artistically COLOURED or put in OUTLINE by Mr. GOWAR, of eight years' experience in the profession. Terms moderate, either by the week or per contract. First-class specimens and testimonials.—Address, 2, Southerton-road, Hammersmith, W.

T. A. RICHARDSON, Architectural Artist.

PERSPECTIVES OUTLINED, ETCHED, or Artistically COLOURED. Every description of Architectural Assistance on moderate terms. Highest references. Sixteen years' experience.—6 Symond's Inn, Chancery-lane, London.

EDUCATION.—The Son of a first-class Builder can be placed immediately in a good School, on moderate and reciprocal terms.—Address, OMICRON, Mr. Cumper's, High-street, St. John's Wood.

FOREMAN WANTED.—A thoroughly competent Man, to act as BUILDER'S FOREMAN. He must understand building in all its branches, be able to set out work, measure, and take out quantities. State age, and salary required.—Apply, Z. Post-office, Red-hill.

TO BUILDERS, DECORATORS, &c.

GILDERS, thoroughly experienced in House Work, Decorative Furniture, and Gilding in all its branches, may be OBTAINED at the House of Call, Marlborough Inn, Blenheim-steps, Oxford-street.—Address to the Secretary.

GLASS STAINERS. — WANTED, an intelligent and experienced GLASS STAINER to superintend work and workmen.—Apply to BA LLANTINE & SON, Edinburgh.

IRONFOUNDING, &c. — WANTED, a respectable YOUTH, of good attainments, active, and with an artistic taste, as APPRENTICE in the London House of a Glasgow firm. He will have every opportunity of learning drawing and the general routine of a warehouse.—Address, with full particulars, JUNIOR, Office of "The Builder."

TO SURVEYORS' DRAUGHTSMEN.

TWO good MAPPERS' DRAUGHTSMEN and WRITERS are WANTED. The situations may be permanent ones.—Applications, with full references and specimens, may be sent (stamped), addressed "SURVEYOR," to Mr. J. Bell, Bookseller, Nottingham.

TO BUILDERS' FOREMEN, ESTATE AGENTS, and all connected with the letting of houses in Islington and outskirts, a liberal commission is offered for securing the custom of incoming tenants for an article of daily consumption, or a fee for information.—Address, A. B. care of Norton & Son, 1, Park-street, Liverpool-road, N.

WANTED, a YOUTH, in a Surveyor's Office. Small premium required.—Address, 232, Office of "The Builder."

WANTED, an experienced and clever CLERK of WORKS, to superintend the erection of a number of first-class houses. Only persons of undoubted efficiency and unexceptionable character need apply. A good draughtsman preferred.—Address, 183, Office of "The Builder."

WANTED, a good PAINTER; one who thoroughly understands his business. No other need apply. Address, Mr. GEO. PICKERDEN, 29, Union-street, Hackney-road.

WATER WORKS, PESTH.—WANTED, an ASSISTANT or RESIDENT ENGINEER, to superintend works of Pipeage, Masonry, and Pumping Machinery. Men having scientific and especially practical knowledge of these branches of construction are requested to apply, by letter (with testimonials), to Mr. W. LINDLEY, Engineer in Chief at Pesth. A knowledge of the German language is desirable. Applicants to state what salary they require: it is assumed at from 400*l.* to 600*l.* a year, dependent upon qualities and experience.

WANTED, TO LET (Labour only), to thoroughly practical Workmen, the BRICKWORK, MASONRY, and CARPENTER'S WORK of a large Residence, within a radius of seventy-five miles from St. Paul's.—Address, with reference, to No. 181, Office of "The Builder."

TO BUILDERS, &c.

WANTED, by a respectable Young Man, EMPLOYMENT as CARPENTER and JOINER. Used to the bench. Wages not so much an object as a permanency.—Address, W. W. Joiner, Post-office, Reading.

WANTED, by a thoroughly practical Man, a SITUATION as WORKING FOREMAN of PAINTERS. Well up in all kinds of house and church decorations. Wages moderate.—Address, F. W. Rose-cottage, Church-road, Acton.

TO PLUMBERS AND BUILDERS.

WANTED, by a Young Man, a SITUATION as THREE-BRANCH HAND. A good plumber. State wage.—Address, 162, Office of "The Builder."

TO PLUMBERS AND BUILDERS.

WANTED, by a first-class PLUMBER, well up in Gasfitting and Hot-water Work, a permanent SITUATION. Town or country. Wages, 7½d. per hour. Good references.—Address, V. A. Beaufort House, Monmouth-street, Bath.

TO MASTER PAINTERS AND BUILDERS.

WANTED, by a practical Man, a SITUATION as WORKING FOREMAN of PAINTERS. Can do Graining, Marbling, Gilding, &c.—Address, J. T. No. 2, Buck's-place, John-street, King's-road, Chelsea, S.W.

TO BUILDERS, PLUMBERS, AND OTHERS.

WANTED, by a respectable Young Man, a SITUATION, as PLUMBER. Good references, if required. Address, J. F. S. 4, South-street, Pentonville.

TO ARCHITECTS.

WANTED, by an experienced Clerk of Works, a RE-ENGAGEMENT. Is well up in all the branches, and a good draughtsman. First class testimonials, from town and country.—Address, S. W. 18, George-street, Salmon's-lane, E.

TO SAW-MILL PROPRIETORS AND TIMBER-MERCHANTS.

WANTED, by a Middle-aged Man, a RE-ENGAGEMENT as SUPERINTENDENT of a Saw-mill, or Yard Foreman, &c. in a Retail Yard. Twenty years' references.—Address, A. L. 3, Bywater-street, King's-road, Chelsea, S.W.

TO ARCHITECTS.

WANTED, an ENGAGEMENT as JUNIOR ASSISTANT. Accustomed to the general duties of an Office. Salary moderate.—Address A. G. 16, Lyndhurst-grove, Lyndhurst-road, Peckham.

TO ARCHITECTS, BUILDERS, &c.

WANTED, a RE-ENGAGEMENT as CLERK of WORKS, General Managing, or Shop Foreman of Joiners. Thoroughly experienced in first-class works, church Gothic, and restoration, by eminent London architects. Good estimator and accountant. Highest references. Town or country. Aged 38.—Address, H. S. 16, Upper Tulse-hill, Brixton, S.W.

TO ARCHITECTS.

WANTED, a RE-ENGAGEMENT as CLERK of WORKS, by a thoroughly efficient Man, used to preparing working drawings, and measuring up work.—Address, 146, Office of "The Builder."

WANTED, an ENGAGEMENT, by a MEASURING and QUANTITY CLERK. Twelve years' experience. A practical Joiner, &c.—Address, BUILDER, 81, Lupus-street, Pimlico, S.W.

TO ARCHITECTS.

WANTED.—A Gentleman, of many years' experience, is desirous of a RE-ENGAGEMENT as ASSISTANT. Perspective, working drawings, details, &c. Town or country.—Address, ARCHITECT, No. 33, Gloucester-street, Queen-square, W.C.

WANTED, by a good GRAINER and MARBLER, a SITUATION or JOB. Can be well recommended, and specimens seen. Cheap estimates given for all kinds of work, by job or yard.—Address, W. C. K. 3, Park-place, Knightsbridge, Brompton.

TO BUILDERS AND PLUMBERS.

WANTED, by a good PLUMBER, a SITUATION or Job. No objection to fill up time with Painting or Glazing. Good references.—Address, A. B. 65, Charrington-street, St. Pancras, N.W.

TO BUILDERS,

WANTED, by the Advertiser, a RE-ENGAGEMENT as FOREMAN of BRICKLAYERS, or Brickwork by the Piece, in Town or country. Good references.—Address, G. E. 45, Park-street, Dorset-square.

WANTED, by a thoroughly practical and energetic Man, an ENGAGEMENT as GENERAL FOREMAN. Well up in setting out work, measuring up, keeping accounts, &c. Accustomed to all branches. Carpenter by trade. Good references. Aged 31.—Address, W. A. 27, Hollington-street, Avenue-road, Camberwell.

WANTED, a RE-ENGAGEMENT, as BUILDER and CONTRACTOR'S MANAGER (or as CLERK of WORKS), by a thoroughly practical Man of fifteen years' experience as an Estimator, Measurer, Quantity Surveyor, and Draughtsman. Has carried out extensive contracts, both public and private, in town and country. Excellent references and testimonials. Accustomed to the entire management. Aged 39.—Address, QUANTUM, 19, Chrysell-road, North Brixton, London, S.E.

WANTED, a RE-ENGAGEMENT as FOREMAN of JOB, in town or country, by a thoroughly practical, steady, and active Man. Joiner by trade. Well acquainted with all branches in the building line. Has been engaged as above the last thirteen years.—Address, 208, Office of "The Builder."

TO BUILDERS, SURVEYORS, &c.

WANTED, by a Youth, a RE-ENGAGEMENT in an Office of the above. Can trace and copy plans neatly, square dimensions, abstract time and materials, put into bill, &c. and has also been accustomed to the regular routine of a builder's office. Unexceptionable references can be given.—Terms, &c. to be addressed to 209, Office of "The Builder."

TO BUILDERS AND PLUMBERS.

WANTED, a SITUATION, by a PLUMBER, GASFITTER, and ZINCWORKER. Good references can be given if required.—Address, D. F. No. 13, Gloucester-street, Queen-square, Bloomsbury, W.C.

WANTED, a JOB, by a PLUMBER, of great experience. Piecework or otherwise. Can do plain zincwork and gasfitting.—Address, G. B. D. Plumber, 147, High Holborn.

TO ARCHITECTS AND ESTATE AGENTS.

WANTED, by a thoroughly experienced practical CLERK of WORKS, a RE-ENGAGEMENT. Has been employed under Government about 8 years preparing Plans, Specifications, and Estimates, for all kinds of buildings, and superintending and measuring works. First-class references.—Address, 151, Office of "The Builder."

TO ARCHITECTS AND SURVEYORS.

WANTED, an ENGAGEMENT (either Temporary or Permanent), by an efficient DRAUGHTSMAN. Can prepare either fair or working drawings, take out quantities, or measure up work. Also thoroughly acquainted with land surveying and levelling. Unexceptionable references.—Address, H. J. Messrs. Noyes & Friend, 77, Western-road, Brighton.

TO PLUMBERS AND BUILDERS.

WANTED, by a thorough practical PLUMBER, a CONSTANCY or JOB, wages 6½d. per hour, for a permanency. Will fill up his time in painting, &c. Good reference.—Address, PLUMBER, 13, Newington Green-road, N.

TO BUILDERS AND CONTRACTORS.

WANTED, by a Young Man, aged 29, a SITUATION as GENERAL CLERK. Can prepare plain drawings, measure, and estimate, and is a good book-keeper. Is accustomed to jobbing works, and would undertake the management of a small business.—Address, J. B. 7, College-terrace, Bond-street, Chelsea, S.W.

TO ARCHITECTS.

WANTED, a RE-ENGAGEMENT, temporary or otherwise. Is a good geometrical and perspective draughtsman, also well up in colouring and preparing drawings for competition. Good references. Salary moderate.—Address, A. D. 63, Southampton-row, W.C.

TO FURNISHING IRONMONGERS, SMITHS, AND BUILDERS.

WANTED, a SITUATION, by a first-class Mechanic, in the Smith, Bellhanging, Gasfitting, Close-range, Bath, Steam, and all kinds of Hotwater Work. First-class reference.—Address, W. X. Mr. Chapman, 3, Queen's-terrace, Trafalgar-road, Greenwich.

TO AUCTIONEERS, SURVEYORS, &c.

WANTED, by a SURVEYOR, a SITUATION, in either of the above offices. Is a good draughtsman, surveyor, and leveller, and writes a neat hand. Aged 22.—Address, ALPHA, care of Messrs. Kingsbury & Co. 4, Birchin-lane.

TO BUILDERS, ROAD-MAKERS, AND CONTRACTORS.

WANTED, by a first-class practical Man, a Carriageway Pavior, Street Mason, Granite Dresser (Wood Bricks, Dutch Clinkers, or Tiles), to TAKE WORK by the PIECE. Labour only. Good testimonials and references.—Address, JAMES CRUTCHLEY, 7, James-place, North-street, Poplar.

WANTED, a SITUATION as BUILDER'S MANAGER or SUPERINTENDENT of WORKS. General knowledge of every branch of the business, measuring, estimating, and drawing, purchasing materials. No objection to conduct a contract abroad. First-class references.—Address, J. C. care of R. Unsworth, Esq. 1, Raymond-buildings, Gray's-inn.

TO BUILDERS AND OTHERS.

WANTED, by a thoroughly practical Man (Carpenter) a RE-ENGAGEMENT as GENERAL FOREMAN. Fifteen years similarly employed. Good testimonials. Town or country.—Address, G. N. L. 9, Blackfriars-road, S.E.

TO BUILDERS.

WANTED, a SITUATION, by a Young Man, as CLERK or ASSISTANT. Has had bench experience, charge of work, likewise a good draughtsman, with a fair knowledge of measuring and quantities.—Address, G. 10, Athelstane-terrace, Stroud-green, Holloway.

TO BUILDERS, &c.

WANTED, by a practical, steady Man, a RE-ENGAGEMENT as SHOP or OUT-DOOR FOREMAN, or Charge of a Job: by trade a carpenter and joiner. Has a good knowledge of all the branches of the trade. Good references. Aged 35.—Address, A. B. 6, Bryant's-road, Albert-road, Peckham.

TO SURVEYORS AND BUILDERS.

WANTED, a RE-ENGAGEMENT, by a Young Man, well acquainted with office duties, drawing taking off quantities, measuring up and estimating works, &c. Twelve years' references from surveyors and builders in town.—Address, A. B. 6, Foley-street, W.

TO BUILDERS AND OTHERS.

WANTED, a SITUATION, by an experienced Man, in Greenhouses, Stairs, Shopfronts, Boxing Shutters, Sashes, Frames, the general Building, Alterations, and Repairs. Wages 6½*d.* per hour. Aged 50.—Address, A. R. 15, Hanover-square, Kennington Park-road, S.E.

TO BUILDERS AND CONTRACTORS.

WANTED, by a GENERAL FOREMAN, Charge of a JOB. Carpenter by trade. Age 43. Good references.—Address, H. F. 44, Lesly-street, Roman-road, Islington.

TO BUILDERS.

WANTED, a SITUATION as JUNIOR CLERK, by a Young Man, aged 22. Has been nearly seven years with a London Architect, is a good draughtsman, quick penman, and can assist at quantities. Country preferred. First-class reference. Salary moderate.—Address, 170, Office of "The Builder."

TO ARCHITECTS, &c.

WANTED, by a thoroughly efficient CLERK of WORKS, a RE-ENGAGEMENT, in town or country. First-class testimonials. Aged 38.—Address, S. F. 5, Post-office, Uxbridge-road, Shepherd's Bush, W.

TO BUILDERS, PLUMBERS, AND GASFITTERS.

WANTED, EMPLOYMENT, as GAS and HOT-WATER FITTER, Brass Finisher, Bellhanger, and Jobbing Plumber. Moderate wages. Constant or job.—Address, H. 4, George-street, Langham-street, W.

TO BUILDERS.

WANTED, by a practical BUILDER'S FOREMAN, a RE-ENGAGEMENT as SHOP, GENERAL, or OUT-DOOR FOREMAN. Can measure up, make out working drawings, &c. Good references.—Address, A. J. 53, Peel-street, Kensington, W.

WANTED, EMPLOYMENT as DRAUGHTSMAN, COLOURIST, QUANTITY CLERK, &c. No objection to a good contractor's, builder's, engineer's, &c. Design, perspective, measuring up, dilapidations, &c. Principally used to illa and warehouse work. Terms from 35*s.* weekly. Aged 35 (married).—Address, B. X. 9, Canterbury-terrace, Ball's Pond, N.

WANTED, a RE-ENGAGEMENT, as GENERAL FOREMAN of JOB, or to Manage a good Jobbing Business. Carpenter and Joiner. Well up in all the branches. Age 38. Good references. No objection to the country.—Address, S. J. 15, Sussex-place, Mashrough-road, Hammersmith, W.

TO SURVEYORS OR BUILDERS.

WANTED, a SITUATION as JUNIOR CLERK. Used to abstracting and billing dimensions, tracing drawings, and general office routine. Three years' reference to last employer.—Address, H. C. 10, Retreat Cottages, Albert-road, Peckham, S.E.

TO ARCHITECTS AND SURVEYORS.

WANTED, by the Advertiser, an ENGAGEMENT in an Architect and Surveyor's Office. Is a fair draughtsman, has a knowledge of quantities and measuring, and is otherwise acquainted with office routine. Nearly five years' experience. Good testimonials and references.—Address, DORIC, care of Messrs. Hisco ke & Son, Hill-street, Richmond, S.W.

TO ARCHITECTS.

WANTED, by an experienced ASSISTANT, a SITUATION in an Office. Salary moderate.—Address, 193, Office of "The Builder."

WANTED, by a Young Man, who has been accustomed to a good Jobbing Business, a SITUATION or JOB as PLUMBER or THREE-BRANCH HAND. Town or country.—Address, by letter only, A. B. 24, Park-street, Gloucester-gate, N.W.

WANTED, by a respectable Young Man, of energy and experience in the Marble business, an ENGAGEMENT as SALESMAN, or to Take Charge of a Show-room, or as Timekeeper, &c. in any manufacturing business.—Address, F. W. 33, Vorley-road, Junction-road, Upper Holloway.

WANTED, by a Builder's son an ENGAGEMENT in any position of trust. Can prepare plans, specifications, take out quantities, and generally carry out any class of building.—Address, S. I. care of Davies & Co. Advertising Agents, Finch lane, Cornhill.

TO BUILDERS AND FOREMEN JOINERS.

WANTED, by a persevering Young Man, a SITUATION as IMPROVER in a good JOINERS' SHOP. Understands all kinds of common joiners' work. Has been over four years at the bench.—Address, R. S. 25, High-street, Fulham, S.W.

TO BUILDERS AND CARPENTERS.

WANTED, to PLACE a YOUTH, as IN-DOOR APPRENTICE, about twenty or thirty miles from London. In reply, state amount of premium and all particulars.—Address, G. G. & R. Dalton's Library, 61, Cambridge-street, Pimlico.

WANTED, by a CIVIL ENGINEER, an ENGAGEMENT. Besides the usual routine of all Field and Office work and Construction, he undertakes the design and setting-out of Service and Distribution Channels for Sewage, and all works connected therewith.—Address, E. X. Messrs. Elliott, 449, Strand.

WANTED, by the Advertiser, a RE-ENGAGEMENT as BUILDER'S CLERK. Is well up in general office work and estimating.—Address, BOX, 77, Coleman-street, E.C.